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Coverage
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Preface

Through time, the Census of Canada has become the primary source of information about Canadians and how they live. Decisions based on this information affect the social and economic affairs of all Canadians.

Statistics Canada, as the agency in charge of producing this information, has a professional responsibility to inform users of the quality of its data. Such information includes the concepts and methodology used in collecting and processing the data, as well as any other features of the data that may affect their use or interpretation.

In order to inform users about the quality of 1991 Census data, Statistics Canada has prepared the following publications: a census **Dictionary**, which provides concise and easy to understand textual and graphical information pertaining to census concepts; a **Handbook**, which provides an overview of how the census is conducted; and a series of **Technical Reports**, which present more detailed information on specific aspects of data quality, such as this report on **coverage**.

Information on data quality is important for users. It allows them to assess the usefulness of census data for their purposes as well as the risks involved in basing conclusions or decisions on these data. Information on data quality is also important to Statistics Canada in the development and maintenance of relevant and reliable statistical programs.

This report was prepared by Don Royce, Marie-France Germain, Claude Julien, Peter Dick, Karen Switzer and Benoit Allard of the Social Survey Methods Division. The authors would like to acknowledge the contributions of their colleagues in Social Survey Methods Division, Demography Division and Census Operations Division who played a key role in the production of this publication.

Finally, I would like to express my appreciation to the millions of Canadians who completed their questionnaires on June 4, 1991, as well as to those who assisted Statistics Canada in planning and conducting the census.

Ivan P. Fellegi
Chief Statistician of Canada

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I.   Introduction

The Canadian Census of Population is a major undertaking. It consists of several phases, each one of which is complex and consumes a significant amount of time and resources. The desired information is sought through a set of questions established after detailed consultations and tests. The data are collected in a specified manner through trained enumerators. The data are checked for inconsistencies and errors and corrections are made. The final results are placed on a computer database and selected data are analyzed and disseminated in a variety of forms.

The primary objectives of the 1991 Census were to obtain accurate counts of the population, households and dwellings at all geographic levels, as well as a broad range of information on their characteristics. The information ranges from age and sex of individuals to their language, ethnic origin, education, occupation, labour force activity, industry, sources of income, and their family and household characteristics. The census is an invaluable source of information that is useful to various levels of government, to businesses, associations, interest groups, and to the general public. The data can be used in government planning of social and economic programs, in assessment of the need for education and health facilities, and in planning by private enterprise.

In a massive project such as the census, however, the results are never perfect. Although considerable effort has been made to maintain high standards of quality, errors inevitably occur at various stages of the collection and processing operations. Users should be aware of the nature and scope of any errors that the census data may contain, as well as the risks involved in basing conclusions or decisions on these data. In order to inform data users of the potential problems of the data, a number of programs for assessing the quality of census data have been developed.

The **1991 Census Technical Reports** inform users of the conceptual framework and definitions used in conducting the census, as well as the data collection and processing procedures employed. Principal sources of error, including, where possible, the size of these errors, are also described, as are any unusual circumstances which might influence the data. With this information, users can better assess whether the data adequately approximate what they wish to measure and whether the estimates they wish to use were produced with tolerances acceptable for their intended purpose.

This report deals with **coverage errors**, which occur when persons, households, dwellings or families are missed by the census or are enumerated in error. Coverage errors are one of the most important types of error in the census since they affect not only the accuracy of the counts of the various census universes but also the accuracy of all of the census figures describing the characteristics of these universes.

Chapter 2 defines the various census universes that the census attempts to cover. Chapter 3 describes the collection and processing operations in which coverage errors may occur, as well as the steps that are taken to control such errors. Chapter 4 gives an overview of the coverage measurement program for the 1991 Census while Chapters 5 through 8 describe the methodology and results of each of the four coverage studies carried out for the 1991 Census. Chapter 9 presents estimates of net coverage error in the 1991 Census and Chapter 10 provides additional analysis of coverage errors.

II. Census Universes

2.1 Introduction

The 1991 Census involved the enumeration of five **universes**:

1. the population universe;

2. the dwelling universe;

3. the household universe;

4. the census family universe; and

5. the economic family universe.

The 1991 Coverage Error Measurement Program dealt primarily with the population and household universes. For the first time, the program also attempted to assess the accuracy of the census family universe, but these results are not included in this report.

The remainder of this chapter defines the various universes in order to provide a reference against which coverage errors may be measured. Readers are also referred to the census **Dictionary**, which contains more detail on the variables associated with each universe.

2.2 Population Universe

The following groups of persons were **included** in the population universe of the 1991 Census:

- Canadian citizens and landed immigrants with a usual place of residence in Canada;

- Canadian citizens and landed immigrants who are abroad, either on a military base or attached to a diplomatic mission;

- Canadian citizens and landed immigrants at sea or in port aboard merchant vessels under Canadian registry;

- persons in Canada claiming refugee status;

- persons in Canada who hold a student authorization (foreign students, student visa holders);

- persons in Canada who hold an employment authorization (foreign workers, work permit holders);

- persons in Canada who hold a Minister's permit (including extensions); and

- all non-Canadian born dependants of persons claiming refugee status, or of persons holding student authorizations, employment authorizations or Minister's permits.

For census purposes, the last five groups in this list are referred to as **non-permanent residents**.

The following groups of persons, known collectively as **foreign residents**, were **not included** in the population universe of the 1991 Census:

- government representatives of another country attached to the embassy, high commission or other diplomatic body of that country in Canada, and their families;

- members of the Armed Forces of another country who are stationed in Canada, and their families; and

- residents of another country visiting in Canada temporarily.

The inclusion of non-permanent residents was an important change for the 1991 Census. In censuses previous to 1991, non-permanent residents were considered to be foreign or census residents and were not included in the population universe. Users should bear this in mind when making comparisons of data from 1991 and previous censuses.

The above definitions indicate who should be included in the census, but not where these persons should be enumerated. For this purpose, the Canadian census uses the *de jure* method of enumeration, whereby persons are to be enumerated at their usual place of residence, even if temporarily away at the time of the census. Persons away from their usual place of residence at the time of the census are called **temporary residents** (not to be confused with non-permanent residents, which refers to the legal status of the person while in Canada). Persons without a usual place of residence are to be enumerated wherever they happen to be on Census Day. Some other countries use the *de facto* method, whereby all persons are to be enumerated wherever they are on Census Day, regardless of their usual place of residence.

2.3 Dwelling Universe

A **dwelling** is defined as a set of living quarters in which a person or group of persons resides or could reside. Only dwellings in Canada are included. There are two types of dwellings:

A **private dwelling** is a separate set of living quarters with a private entrance either from outside or from a common hall, lobby, vestibule or stairway inside the building. The entrance to the dwelling must be one which can be used without passing through the living quarters of someone else.

A **collective dwelling** is a dwelling of a commercial, institutional or communal nature. It may be identified by a sign on the premises or by a census representative speaking with the person in charge or with a resident or a neighbour, etc. Included are rooming– or lodging-houses, hotels, motels, tourist homes, nursing homes, hospitals, staff residences, communal quarters of military camps, work camps, jails, missions, group homes, and so on.

These two main types of dwellings are subject to more detailed classifications:

Private dwellings can be **regular** private dwellings, **marginal** dwellings, or dwellings **under construction**. Regular private dwellings are further classified into three groups: dwellings **occupied by usual residents**, dwellings **occupied solely by foreign or temporary residents**, and **unoccupied** dwellings. Marginal dwellings and dwellings under construction are classified as **occupied by usual residents** or **occupied solely by foreign or temporary residents**. Marginal dwellings and dwellings under construction that were unoccupied on Census Day are not included in the dwelling universe.

Collective dwellings are classified into dwellings **occupied by usual residents**, dwellings **occupied solely by foreign or temporary residents**, and **unoccupied** collective dwellings. In the case of unoccupied collective dwellings, data were collected but are not included in census publications.

In summary, the dwelling universe **included**:

- regular private dwellings occupied by usual residents;

- regular private dwellings occupied solely by foreign or temporary residents;

- regular private dwellings that are unoccupied;

- marginal dwellings or dwellings under construction, provided they were occupied on Census Day;

- collective dwellings occupied by usual residents; and

- collective dwellings occupied solely by foreign or temporary residents.

The dwelling universe **did not include**:

- marginal dwellings or dwellings under construction that were unoccupied on Census Day;

- collective dwellings that were unoccupied on Census Day; and

- dwellings outside Canada.

2.4 Household Universe

The term "household" refers to a person or group of persons (other than foreign residents) who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada. It may consist of a family group (census family) with or without other non-family persons, of two or more families sharing a dwelling, of a group of unrelated persons, or of one person living alone. Household members who are temporarily absent on Census Day (e.g., temporary residents elsewhere) are considered as part of their usual household. For census purposes, every person is a member of one and only one household, except for Temporary Resident random additions (see Chapter 6), which are included only in the population universe.

Households are classified into three types, depending on the type of dwelling in which they reside: **private** households, **collective** households, and households **outside Canada**. Note that households outside Canada are not associated with a dwelling since dwellings outside Canada are not included in the dwelling universe. Most published census data on households refer to private households only.

2.5 Census Family Universe

The term "census family" refers to:

- a now-married couple with or without never-married sons or daughters of either or both spouses living in the same dwelling;

- a couple living common-law with or without never-married sons or daughters of either or both partners living in the same dwelling; or

- a lone parent of any marital status, with at least one never-married son or daughter living in the same dwelling.

Census families are reported only for the population in private households, Hutterite collectives and households outside Canada.

2.6 Economic Family Universe

An economic family is defined as a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption. Economic families are reported only for the population in private households, Hutterite collectives, and households outside Canada.

2.7 Relationships among Universes

Table 2.1 gives a summary of the three basic universes according to the location of the dwelling (in Canada or outside Canada), the classification of the dwelling (private or collective), and its occupancy status. For each group in the table, an indication is given as to whether it is included or excluded from each universe. For example, Canadian government employees living abroad with their families are included in both the population and household universes but excluded from the dwelling universe. Categories flagged with an asterisk (*) represent groups for which data are collected but which are excluded from most census publications.

Table 2.1   The Population, Household and Dwelling Universes and Their Relationships

	Population	Households	Dwellings
Dwellings in Canada:			
1. Regular private dwellings			
• occupied by usual residents	I	I	I
• occupied solely by foreign or temporary residents	E	E	I*
• unoccupied	–	–	I*
2. Private dwellings, marginal or under construction			
• occupied by usual residents	I	I	I
• occupied solely by foreign or temporary residents	E	E	I*
• unoccupied	–	–	E
3. Collective dwellings			
• occupied by usual residents	I	I*	I*
• occupied solely by foreign or temporary residents	E	E	I*
• unoccupied	–	E	E*
4. Temporary Resident random additions	I	E	E
5. Vacancy Check random additions	I	I	I
Dwellings Outside Canada:			
6. Canadian citizens and landed immigrants who are abroad, either on a military base or attached to a diplomatic mission	I	I*	E
7. Canadian citizens and landed immigrants at sea or in port aboard merchant vessels under Canadian registry	I	I*	E

Note: I = included, E = excluded, – = not applicable

* indicates that data were collected but are not included in most publications.

2.8   Coverage Errors

Coverage errors may be defined as errors that affect the accuracy of the counts of the various census universes. There are two types of coverage errors: undercoverage and overcoverage.

Undercoverage occurs when a unit which is part of a census universe is completely missed by the census. **Overcoverage**, on the other hand, may occur in two ways. First, and most common, is the situation where a unit which is part of a census universe is enumerated more than once. Second, a unit which is outside the census universe (e.g., a foreign resident, a household pet, or a fictitious person) may be erroneously enumerated.

It should be noted that a geographic error alone does not constitute a coverage error. For example, a person who is enumerated in the wrong geographic area does not represent overcoverage for the area in which the person was enumerated and undercoverage for the area in which the person should have been enumerated.

Undercoverage of a household is defined as the situation where all persons in the household are missed. Situations where some but not all of the persons in the household are missed are not considered as household undercoverage, even though they cause an error in the characteristics of the household, such as its size or composition. Similarly, overcoverage is defined as the situation where all members of the household are overcovered.

III. How the Census Is Conducted

The various census operations that lead to a set of data ready for dissemination may be divided into two main phases: collection and processing. This chapter describes these two phases, as well as the steps taken to minimize and control coverage errors during these operations.

3.1 Collection

The purpose of the collection phase was to enumerate the dwelling, household and population universes and to collect the required information about each enumerated unit. This was achieved by first listing all dwellings in a Visitation Record (VR), classifying them as either private or collective dwellings, and specifying their occupancy status (occupied or unoccupied). Once this operation was completed, a member of the household was asked to list all usual occupants of the dwelling included in the population universe (even if temporarily absent on Census Day) and to report their characteristics.

To carry out this phase, the country was divided into approximately 46,000 enumeration areas (EAs). Each EA was assigned to a Census Representative (CR) who was specially trained to carry out the collection activities. The average assignment for a CR was about 300 households.

Two basic collection methods were used: mail-back and canvasser. The mail-back method was used in all areas of the country except for remote areas and most Indian reserves and settlements, where the canvasser method was used. In both methods, the CR was required to identify and list all dwellings and to drop off or complete the appropriate census form.

With the mail-back method, the Census Representative dropped off a questionnaire. The household was instructed to complete it as of June 4, 1991, and to return it through the mail. The returned questionnaires were edited, and if necessary, were followed up by telephone or in person to complete missing information. Households for which questionnaires were not received were also followed up by telephone or in person in order to complete their questionnaires.

In the canvasser method, data were collected by personal interview at the same time the dwelling was enumerated by the CR. Canvasser areas represented about 1% of the total population of Canada.

In addition to the basic demographic and housing data that were collected from all households, additional data were collected for a sample of households. In most mail-back areas, the CR delivered a longer questionnaire to every fifth occupied private dwelling (a 20% sample). In canvasser EAs and in some other special circumstances, the longer questionnaire was used for all households in the EA.

Following the completion of collection by the CR, the work was checked by the CR's supervisor (the Census Commissioner) and by a Quality Control Technician. Once the work was approved, the questionnaires and visitation records were forwarded to the data processing operations.

3.2 Data Processing

The data processing phase resulted in a final census database from which the census tabulations were retrieved. In 1991, there were five stages of processing.

3.2.1 Regional Office Processing

This stage was conducted in six of the regional centres of Revenue Canada as well as Census Headquarters in Ottawa. The operations included a check of questionnaires against visitation records to ensure that the counts of households and persons matched, manual edits to ensure that the questionnaires were ready for key entry, and coding operations to convert written responses to numeric codes prior to keying. An independent verification of a sample of records was used to control the quality of the coding.

3.2.2   Direct Data Entry

Data from the census of population questionnaires were keyed and then transmitted electronically to Revenue Canada headquarters in Ottawa where they were stored on magnetic cartridges and transported to Statistics Canada on a daily basis. Again, an independent verification of a sample of each batch of work was used to control the quality of the keying operation.

3.2.3   Head Office Processing

This stage consisted of several automated and manual operations designed to identify and correct inconsistencies among counts of dwellings, households and persons at the EA and household levels. Inconsistencies found by the system were resolved manually. This stage also included special processing of persons enumerated outside Canada or on ships, and the processing of the four coverage studies described in Chapters 5 to 8. The final step was to load the data onto a database for the edit and imputation operation.

3.2.4   Automated Coding

For this stage, which was new for 1991, the written responses to certain questions (e.g., mother tongue, ethnic origin) were converted to numeric codes using an automated system. The written responses were keyed during direct data entry and the captured written responses were matched against an automated reference file containing a series of words or phrases and the corresponding numeric codes. Responses that could not be coded by the automated system were resolved by processing staff and coding consultants using a computer-assisted process. Again, quality control procedures were used to control the quality of the operation.

3.2.5   Edit and Imputation

At this stage, problems arising from inconsistent or missing data were identified and corrected. Such errors may arise as a result of the respondent answering the questions incorrectly or incompletely, or they can arise during subsequent processing activities. Once the editing detected an error (for example, a married five-year-old), imputation was performed to resolve the problem. The data collected on a 100% basis were edited and imputed first, followed by the 20% sample data. It was also at this stage that the 20% sample was weighted up to the full population. Once the data were imputed and weighted, they were loaded to a final census retrieval database from which tabulations were produced.

3.3   Sources of Coverage Errors and Their Control

In most cases, coverage errors occur during the collection phase. For example, undercoverage of persons and households occurs when occupied dwellings are missed completely or when they are misclassified as unoccupied. Population undercoverage also occurs when a person is missed within an enumerated household (i.e. certain of its members are missed). Overcoverage can occur when there is uncertainty about a person's usual place of residence, for example a university student who is enumerated at both the parental home and the university residence.

Coverage errors can also be introduced during the processing phase when records for persons or households are erroneously cancelled or lost, or artificially created.

These potential sources of error were recognized during the planning of the 1991 Census and a number of control measures were taken to minimize them. These included:

(a)   careful definition and mapping of enumeration area (EA) boundaries to ensure that no areas were left out or included twice;

(b)   instructions in the CR's manual on how to canvass his/her EA so as to minimize the risk of missing dwellings;

(c)   creation of an address register from sources independent of the census and the use of this list to check if any dwellings were missed;

(d)   pre-identification of collective dwellings that were to be checked out by field staff to ensure that, if occupied, they were covered in the census;

(e)   special procedures to enumerate persons in soup kitchens who might otherwise be missed;

(f)   special procedures to enumerate the population on Indian reserves;

(g)   publicity messages to inform Canadians about the census, including what to do if they did not receive a questionnaire;

(h)   "Whom to Include" instructions on the census questionnaire to remind respondents of who should be included;

(i)   questions on the census questionnaire asking whether there were any persons the respondent was not sure whether or not to list, and a follow-up to assist the respondent in these cases;

(j)   adjustments to the final census counts to account for two specific components of undercoverage, as measured by the Vacancy Check (Chapter 5) and the Temporary Residents Study (Chapter 6).

These procedures, coupled with appropriate supervisory checks and quality control systems, helped to reduce the number of coverage errors in the census, but failed to eliminate them completely; hence the importance of evaluating the level of coverage errors.

In the 1991 Census, a specific coverage error occurred which users should be aware of. On some Indian reserves and Indian settlements, enumeration was not permitted or was interrupted before it could be completed. Moreover, some Indian reserves and Indian settlements were enumerated too late to be included or the quality of the collected data was considered inadequate. A similar problem occurred in the 1986 Census and, to a lesser extent, in 1981 as well.

These Indian reserves and Indian settlements (a total of 78) are called incompletely enumerated Indian reserves and Indian settlements. Data for 1991 are therefore not available for these areas and are not included in 1991 Census publications. Data for geographic areas containing one or more of these Indian reserves or Indian settlements are noted in the publications. A list of these reserves and settlements along with population and occupied private dwelling counts from the last two censuses (where available) is given in the Appendix section of census publications.

IV. The Coverage Error Measurement Program

4.1 Scope and Objectives of the Program

Ideally, a coverage error measurement program would produce estimates of both undercoverage and overcoverage for each of the five census universes. In practice, however, such an ideal is too costly and is impossible to achieve. It was decided, therefore, to limit the program to the following components of coverage error:

- undercoverage and overcoverage of the population;

- undercoverage and overcoverage of private households; and

- classification errors involving unoccupied private dwellings.

The 1991 Coverage Error Measurement Program consisted of four studies:

- the Vacancy Check;

- the Temporary Residents Study;

- the Reverse Record Check; and

- the Overcoverage Study.

The Vacancy Check produced estimates of coverage errors arising from the incorrect classification of dwellings as unoccupied. The Temporary Residents Study estimated coverage errors arising because some persons were temporarily absent from their usual place of residence on Census Day. The Reverse Record Check was designed to estimate total undercoverage (including that also measured by the Vacancy Check and the Temporary Residents Study). The Overcoverage Study was designed to estimate total overcoverage.

The data resulting from these four studies were used in the following ways:

1. Estimates from the Vacancy Check and the Temporary Residents Study were included in the final census counts to account for these two specific sources of undercoverage.

2. Estimates from the Reverse Record Check and the Overcoverage Study were included in the base population for the Population Estimates Program of Statistics Canada.

3. Information on the causes and characteristics of coverage errors is used in the planning of the next census, by identifying areas or subgroups of the population where the level of coverage error is particularly high.

4. Supplementary information collected by the studies was used to evaluate the quality of selected census questions. For example, the Overcoverage Study contained additional questions on language that were used to evaluate the quality of responses to the census language questions.

5. Finally, the results serve to inform users about the nature and levels of coverage error in the census so that they are better informed when drawing conclusions or making decisions based on census data.

4.2 Coverage Error Concepts

The concepts introduced here apply equally well to persons, households, dwellings or families. We will therefore refer to "units" in general.

Let T represent the total or "true" number of units in the universe in question, and let C be the published census count for this universe. The error resulting from the use of C instead of T is then:

$$N = T - C$$

This is called the **net coverage error.**

As previously noted in Chapter 2, coverage errors are of two types: undercoverage and overcoverage. Let U denote the total undercoverage, that is, the total number of units in the universe in question that were missed in the census, and let E denote the total number of units in the universe that were enumerated at least once. Then,

$$T = U + E$$

and we may write

$$N = (U + E) - C$$
$$= U - (C - E)$$
$$= U - O$$

where the term $O = C - E$ is defined as overcoverage. This error results not only from counting units more than once but also from counting units that are outside the universe in question.

These errors are often expressed as rates, that is, as a proportion of the total number of units in the universe in question. We define these rates as follows:

(a) **undercoverage rate:** $R_U = U/T$;

(b) **overcoverage rate:** $R_O = O/T$;

(c) **net undercoverage rate:** $R_N = N/T$;

so that $R_N = (U - O)/T = R_U - R_O$.

A positive net undercoverage rate indicates that undercoverage is larger than overcoverage, while a negative net undercoverage rate indicates that undercoverage is smaller than overcoverage. In most cases, undercoverage is larger than overcoverage, thus most net undercoverage rates will be positive.

The methodology and results of each of the coverage measurement studies are presented in the next four chapters.

V. Vacancy Check

5.1 Introduction

One of the potential sources of error in the census is the misclassification of dwellings. Occupied dwellings that are incorrectly classified as unoccupied result in undercoverage of both households and persons. The erroneous enumeration of marginal dwellings or dwellings under construction as unoccupied dwellings results in overcoverage of the dwelling universe. The purpose of the Vacancy Check was to study these two types of error.

More specifically, the objectives of the Vacancy Check were to estimate the number of occupied dwellings that were misclassified as unoccupied during the census, to estimate the number of households and persons missed as a result of this misclassification, to adjust the census data for households and persons to correct this misclassification, and finally to estimate the number of dwellings classified as unoccupied that were in fact outside the dwelling universe.

5.2 Methodology

5.2.1 Stratification and Sample Selection

The population targeted by the Vacancy Check was all unoccupied dwellings identified in the census as of June 4, 1991, excluding unoccupied dwellings in collective EAs, canvasser EAs and Indian reserves. These areas were excluded from the sampling frame mainly because of cost and operational considerations.

The remaining EAs were split into separate urban and rural frames for sample selection. In order to be included in the urban frame, an EA must have been part of a census agglomeration (CA) or census metropolitan area (CMA) that had 40,000 or more occupied dwellings. If more than 50% of the EAs in a census commissioner district (CCD) within a CA/CMA were classified as urban EAs, then all EAs within that CCD were considered to be part of the urban frame. All EAs that did not fall into the urban frame became part of the rural frame. The Vacancy Check sample was then selected from these two frames. The sample size for the 1991 Vacancy Check was 1,398 EAs across Canada.

The urban sample had three separate components. In the Yukon and Northwest Territories, all EAs in the frame were selected for the Vacancy Check. In Prince Edward Island, a simple random sample of 51 EAs was selected. The urban sample for all other provinces was selected by stratifying the urban EAs by CA/CMA within each province, i.e. each CA/CMA was considered a stratum. A simple random sample of the required number of EAs was then selected from each stratum. This gave a total of 692 urban EAs in the sample.

Because interviewer field costs such as travel can rise substantially outside urban areas, the rural sample was selected by the use of two-stage sampling. Based on 1986 data, five EAs grouped together was determined to be an appropriate workload for a Vacancy Check interviewer. At the first stage, the allocated number of CCDs was randomly selected for each province. At the second stage, five EAs were randomly selected from each of the selected CCDs. These sampling procedures produced the 706 EAs in the rural sample.

The Vacancy Check sample consisted of all unoccupied dwellings listed in the Visitation Record for all sampled EAs. A total of 21,093 dwellings were selected to be part of the Vacancy Check sample. Table 5.1 shows the sample distribution by province and territory.

Table 5.1 Sample Size by Province/Territory, 1991 Vacancy Check

Province/territory	Number of EAs in sample	Number of unoccupied dwellings in sample
Canada	1,398	21,093
Newfoundland	80	1,800
Prince Edward Island	51	599
Nova Scotia	87	1,375
New Brunswick	74	759
Quebec	268	5,153
Ontario	224	3,261
Manitoba	81	889
Saskatchewan	144	2,447
Alberta	178	1,899
British Columbia	163	2,269
Yukon	25	105
Northwest Territories	23	537

5.2.2 Field Interviews

Each dwelling classified by the Census Representative as unoccupied on Census Day in one of the sampled EAs was checked again by an independent, specially trained interviewer to determine the true occupancy status of the dwelling on Census Day. Vacancy Check interviewing was scheduled during the third week of July 1991, although in some parts of the country it was not completed until as late as September 1991.

The Vacancy Check interviewer was instructed to contact current occupants, neighbours, landlords or any other person with some knowledge about the dwelling in question in their attempt to ascertain occupancy status. Up to three contacts were made for each dwelling. If the dwelling was found to have been occupied on Census Day, the number and names of the occupants of the dwelling on Census Day were also obtained.

5.2.3 Processing, Coding and Editing

All questionnaires were sent to Ottawa for processing after the field interviews were completed. Once in Head Office the questionnaires went through preliminary processing. Any questionnaires not belonging to the sample were eliminated, and in cases where more than one questionnaire was completed for an address, the correct questionnaire for each dwelling was obtained. Edits and general grooming of the questionnaires were then carried out and the questionnaires were sent to be data-captured.

Once data capture was completed, the questionnaires were subjected to an extensive set of consistency edits. Questionnaires failing edit were examined individually in order to resolve the inconsistencies.

For each dwelling found to have been occupied on Census Day, the Visitation Record was checked to determine whether the dwelling had also been listed as an occupied dwelling in the VR. If the dwelling was listed as both an occupied dwelling and an unoccupied dwelling, it was assumed that the occupied dwelling enumeration was correct, i.e. the dwelling and its occupants had been correctly enumerated in the census. The names of the persons on the Vacancy Check questionnaire were removed and the dwelling was placed in the "Not in housing stock" category since it should not have been listed as an unoccupied dwelling.

The questionnaires completed for each EA were then checked against the listings of unoccupied dwellings in the VR. Dwellings for which a Vacancy Check questionnaire was received but no listing was found in the VR were removed from the study. Dwellings which were listed in the VR, but for which no Vacancy Check questionnaire was received, were considered to be non-response.

5.2.4   Non-response, Imputation and Weighting

Total non-response (i.e. no information for a particular dwelling) was dealt with through an adjustment to the sampling weights within each of several subprovincial areas. These subprovincial areas consisted of the three largest CMAs (Montréal, Toronto and Vancouver), along with the remaining urban and rural parts of each province and territory.

Item non-response, that is, no information on occupancy status, number of usual residents and dwelling type was dealt with through imputation. Occupancy status was imputed first, and was then used as a control variable in imputation of the other items.

Finally, the weights were adjusted so that their sum would equal the known number of unoccupied dwellings found in the census for each subprovincial area.

The final step of the Vacancy Check processing was the actual adjustment of the census databases by a process known as "random additions." This was accomplished by first producing a national level profile of misclassified dwellings for both urban and rural areas, using the type of dwelling and the number of persons missed because of the misclassification. These national profiles were then used to create estimates of the number of misclassified dwellings by number of persons in the household, type of dwelling, and rural/urban parts at the province and territory levels. On the basis of these estimates, enumerated households with the same characteristics (number of persons, type of private dwelling) were selected at random, and their weights in the census were increased by one unit. For each household selected, the weight of one unoccupied dwelling from the same EA was set to zero so that the total number of dwellings would not be increased.

5.3   Results

The main results are shown in Tables 5.2, 5.3, 5.4 and 5.5. Table 5.2 gives the estimated number and proportion of dwellings enumerated as unoccupied that were in fact occupied by urban-rural area, by region, by province and by type of dwelling. Table 5.3 shows the number of households and persons added to the 1991 Census counts because of this misclassification. Table 5.4 shows the number of unoccupied dwellings not in the housing stock, using the same breakdowns as in Table 5.2. Table 5.5 shows the reduction in undercoverage rates for households and persons as a result of the Vacancy Check random additions and the overcoverage rates for dwellings.

5.3.1   Occupied Dwellings

Table 5.2 shows that an estimated 10.1% of dwellings that were classified as unoccupied during the census were in fact occupied. These include dwellings that were occupied solely by foreign or temporary residents as well as dwellings for which one or more persons were enumerated elsewhere in Canada. This misclassification of dwellings was more prevalent in urban areas (13.2%) than in rural areas (5.8%).

At the provincial level, Alberta had the highest rate of misclassification with 13.9%. Quebec, Ontario and British Columbia showed very similar rates of misclassification with 10.8%, 10.6% and 10.8% respectively. The rates for the Atlantic provinces, Manitoba and Saskatchewan were lower.

Among the three largest CMAs, the rate of misclassification was much higher in Toronto (19.4%) than in either Montreal (12.2%) or Vancouver (14.5%).

Among the types of dwellings classified in the census, the rate of misclassification was lowest in single-detached houses (7.1%). The rate of misclassification was highest (15.0%) in the "Other" category, which includes semi-detached houses, row houses, duplexes, apartments in buildings that have fewer than five storeys, mobile homes and other movable dwellings.

Owing to this classification error, a number of households and persons were not enumerated in the 1991 Census. However, of the 71,126 dwellings misclassified as unoccupied, some had also been correctly enumerated by the CR as occupied dwellings, and some were occupied by temporary or foreign residents who should (correctly) not have been included in the census counts. The actual number of underenumerated households was estimated at 61,961 and this is the number of households that were added to the census counts via the Vacancy Check Study. Table 5.3 shows the actual number of households and persons that were added to the census counts. As shown in Table 5.5, these 61,961 households represented 0.60% of all households. Similarly, the 126,818 persons added to the census counts represented 0.45% of all persons.

5.3.2 Dwellings Not in the Housing Stock

The enumeration of unoccupied dwellings which fall outside of the dwelling universe results in overcoverage of dwellings. Dwellings are considered to be outside of the dwelling universe if they are used for commercial purposes, if they are not habitable year-round, and if they are double counted in the census – that is, if they are listed in the VR as occupied as well as unoccupied.

In order for a dwelling to be considered suitable for year-round occupancy, it must have shelter from the elements, a source of water and a source of heat. It is sometimes difficult to tell whether a dwelling is in fact habitable, such as in the case of a cottage, of a dwelling under construction and almost complete, or of a dwelling that has deteriorated badly. The question of suitability is therefore a very subjective one, and different enumerators may classify a dwelling differently. For this reason, the estimates of unoccupied dwellings which were identified in the Vacancy Check as not part of the housing stock, given in Table 5.4, were not used to adjust the census counts downwards to account for this overcoverage.

Overall, dwellings outside of the housing stock account for 19.2% of all dwellings classified as unoccupied in the census. The problem is more pronounced in rural areas (24.6%) than in urban areas (15.3%). At the provincial level, the incidence of unoccupied dwellings that were in fact outside of the housing stock ranges from 9.6% in Manitoba to 38.4% in Newfoundland. Among types of dwellings, the problem of misclassification is higher in single-detached houses (25.2%) than in any other type of dwelling. Single-detached houses make up 71% of all dwellings outside of the housing stock.

As Table 5.5 shows, dwelling overcoverage due to the inclusion of dwellings not in the housing stock is estimated at 1.35% of all dwellings. Among the provinces, it ranges from 0.54% in Manitoba to 4.74% in Newfoundland.

Table 5.2   Estimated Number of Occupied Dwellings Misclassified as Unoccupied, 1991 Vacancy Check

Characteristics	Number of dwellings initially classified as unoccupied	Occupied dwellings			
		Estimated total	Standard error	Rate (%)	Standard error (%)
Canada	**702,220**	**71,126**	**5,553**	**10.1**	**0.8**
Urban	411,577	54,290	5,285	13.2	1.3
Rural	290,643	16,836	1,701	5.8	0.6
Atlantic	58,827	3,135	342	5.3	0.6
Newfoundland	20,716	435	107	2.1	0.5
Prince Edward Island	4,008	281	66	7.0	1.7
Nova Scotia	21,522	1,271	225	5.9	1.1
New Brunswick	12,581	1,147	225	9.1	1.8
Quebec	231,225	24,894	2,307	10.8	1.0
Ontario	223,458	23,599	4,806	10.6	2.2
Prairies	118,300	11,943	968	10.1	0.8
Manitoba	22,675	1,494	313	6.6	1.4
Saskatchewan	47,813	3,795	570	7.9	1.2
Alberta	47,812	6,655	717	13.9	1.5
British Columbia	69,657	7,493	1,170	10.8	1.7
Territories	753	62	12	8.2	1.6
Yukon	140	8	5	5.7	3.6
Northwest Territories	613	54	12	8.8	2.0
Selected CMAs					
Montréal	77,430	9,473	1,445	12.2	1.9
Toronto	53,332	10,361	3,106	19.4	5.8
Vancouver	26,905	3,888	742	14.5	2.8
Type of private dwelling					
Single-detached	380,942	27,114	2,176	7.1	0.6
Apartment in a building that has five or more storeys	85,319	8,677	1,812	10.2	2.1
Other	235,959	35,336	3,331	15.0	1.4

Table 5.3   Number of Households and Persons Added by the 1991 Vacancy Check

Characteristics	Number of dwellings initially classified as unoccupied	Households added		Persons added	
		Total	Standard error	Total	Standard error
Canada	**702,220**	**61,961**	**5,170**	**126,818**	**9,958**
Urban	411,577	48,184	4,984	99,144	9,496
Rural	290,643	13,777	1,415	27,674	3,067
Atlantic	58,827	2,603	318	5,135	663
Newfoundland	20,716	318	114	777	287
Prince Edward Island	4,008	233	58	418	103
Nova Scotia	21,522	999	196	1,777	394
New Brunswick	12,581	1,053	216	2,163	438
Quebec	231,225	20,767	1,981	40,008	3,644
Ontario	223,458	22,049	4,562	48,027	8,898
Prairies	118,300	10,129	819	20,126	1,507
Manitoba	22,675	1,355	288	2,332	501
Saskatchewan	47,813	2,926	428	6,165	838
Alberta	47,812	5,848	636	11,629	1,147
British Columbia	69,657	6,357	1,103	13,399	1,996
Territories	753	56	12	123	25
Yukon	140	7	4	8	6
Northwest Territories	613	49	11	115	25
Selected CMAs					
Montréal	77,430	7,987	1,326	15,826	2,651
Toronto	53,332	10,277	3,088	24,122	6,424
Vancouver	26,905	3,291	692	7,285	1,507
Type of private dwelling					
Single-detached	380,942	22,406	1,948	52,615	4,752
Apartment in a building that has five or more storeys	85,319	7,674	1,706	12,002	2,581
Other	235,959	31,881	3,168	62,201	6,283

Table 5.4   Estimated Number of Unoccupied Dwellings Not in Housing Stock, 1991 Vacancy Check

Characteristics	Number of dwellings initially classified as unoccupied	Not in housing stock			
		Estimated total	Standard error	Rate (%)	Standard error (%)
Canada	**702,220**	**134,668**	**7,595**	**19.2**	**1.1**
Urban	411,577	63,093	5,506	15.3	1.3
Rural	290,643	71,574	5,308	24.6	1.8
Atlantic	58,827	17,435	2,552	29.6	4.3
Newfoundland	20,716	7,945	2,127	38.4	10.3
Prince Edward Island	4,008	1,037	236	25.9	5.9
Nova Scotia	21,522	5,992	1,306	27.8	6.1
New Brunswick	12,581	2,460	478	19.6	3.8
Quebec	231,225	48,313	5,357	20.9	2.3
Ontario	223,458	37,113	3,761	16.6	1.7
Prairies	118,300	19,331	2,281	16.3	1.9
Manitoba	22,675	2,179	476	9.6	2.1
Saskatchewan	47,813	11,067	2,112	23.2	4.4
Alberta	47,812	6,084	717	12.7	1.5
British Columbia	69,657	12,363	1,768	17.8	2.5
Territories	753	113	26	15.0	3.5
Yukon	140	23	10	16.4	7.1
Northwest Territories	613	90	24	14.7	3.9
Selected CMAs					
Montréal	77,430	16,519	3,982	21.3	5.1
Toronto	53,332	6,964	2,102	13.1	3.9
Vancouver	26,905	3,947	783	14.7	2.9
Type of private dwelling					
Single-detached	380,942	95,857	6,808	25.2	1.8
Apartment in a building that has five or more storeys	85,319	9,677	3,764	11.3	4.4
Other	235,959	29,133	2,883	12.4	1.2

Table 5.5   **Reduction in Undercoverage Rates for Households and Persons, and Overcoverage Rates for Dwellings, 1991 Vacancy Check**

Characteristics	Reduction in undercoverage				Overcoverage	
	Households[1]		Persons[2]		Dwellings[3]	
	Rate (%)	Standard error (%)	Rate (%)	Standard error (%)	Rate (%)	Standard error (%)
Canada	**0.60**	**0.05**	**0.45**	**0.04**	**1.35**	**0.08**
Newfoundland	0.18	0.06	0.13	0.05	4.74	1.27
Prince Edward Island	0.52	0.13	0.32	0.08	2.37	0.54
Nova Scotia	0.30	0.06	0.19	0.04	1.87	0.41
New Brunswick	0.41	0.08	0.29	0.06	0.97	0.19
Quebec	0.77	0.07	0.57	0.05	1.86	0.21
Ontario	0.59	0.12	0.46	0.09	1.02	0.10
Manitoba	0.33	0.07	0.21	0.05	0.54	0.12
Saskatchewan	0.80	0.12	0.61	0.08	3.12	0.60
Alberta	0.64	0.07	0.45	0.04	0.67	0.08
British Columbia	0.50	0.09	0.40	0.06	1.00	0.14
Yukon	0.07	0.04	0.03	0.02	0.23	0.10
Northwest Territories	0.29	0.06	0.19	0.04	0.55	0.15
Selected CMAs						
Montréal	0.64	0.11	0.49	0.08	1.35	0.32
Toronto	0.73	0.22	0.59	0.16	0.51	0.15
Vancouver	0.53	0.11	0.44	0.09	0.65	0.13

1. Obtained by calculating the ratio of the number of households added by the Vacancy Check to the total number of households that should have been enumerated, that is, the number of enumerated households plus the net undercoverage of households obtained from the 1991 Reverse Record Check and the 1991 Overcoverage Study.

2. Obtained by calculating the ratio of the number of persons added by the Vacancy Check to the total number of persons who should have been enumerated, that is, the number of enumerated persons plus the net undercoverage of persons obtained from the 1991 Reverse Record Check and the 1991 Overcoverage Study.

3. Obtained by calculating the ratio of the number of structures not in the housing stock and erroneously classified as unoccupied dwellings to the total number of dwellings in the housing stock, that is, the total number of enumerated dwellings minus the enumerated dwellings not in the housing stock.

VI. Temporary Residents Study

6.1 Introduction

According to the *de jure* census method, persons are to be counted at their usual place of residence. One of the known causes of undercoverage is a failure to enumerate persons who are away from their usual place of residence on Census Day. The purpose of the Temporary Residents Study was to estimate the level of population undercoverage from this source of error. On the basis of these estimates, individuals were added to the final data base, so that the official population counts take this particular source of undercoverage into account.

6.2 Methodology

6.2.1 Stratification and Sample Selection

The population covered by this study consists of all persons in the population universe who were temporarily absent from their usual place of residence on Census Day. These persons are called **temporary residents** (TRs). Temporary residents were enumerated at the place where they were staying on Census Day with a special form on which they were asked to provide the address of their usual place of residence and some basic characteristics. In 1991, some 576,000 persons were reported as being temporarily away from their usual place of residence on Census Day. The special forms were sent to the head office in Ottawa from the regional processing offices for processing.

Three forms were used for the enumeration of TRs: Form 1A for institutional dwellings such as hospitals and prisons; Form 3 for other collective dwellings and private dwellings; and Form 3B for soup kitchens. Each of these forms made it possible to obtain the address of the TR's usual place of residence and certain basic characteristics (date of birth, sex and marital status). For Form 1A, this information was obtained from the institution's records; for Forms 3 and 3B, it was provided by the respondent.

The forms were stratified according to the province or territory of the usual place of residence (except for 1A, for which the province of the institution was used) and the type of form (1A, 3 or 3B). In addition, Forms 3 were stratified into three categories, according to the type of dwelling from which they originated: private dwelling, shelter, and other collective dwelling. Sixty strata were thus obtained, and in each stratum a systematic sample of forms was selected. The forms for which it was impossible to determine the stratum (unclassifiable forms) were kept separate and ordered by province of temporary place of residence. No sample was selected from this group, because they contained no information on the address of the usual place of residence of the TRs.

Table 6.1 shows the distribution of the sample by province or territory.

Table 6.1   Sample Distribution by Province/Territory, 1991 Temporary Residents Study

Province/territory of usual place of residence	Number of temporary residents	Number of temporary residents sampled
Newfoundland	7,745	481
Prince Edward Island	1,373	242
Nova Scotia	10,749	491
New Brunswick	6,815	482
Quebec	92,621	1,945
Ontario	148,311	3,109
Manitoba	24,072	786
Saskatchewan	31,398	911
Alberta	65,388	1,482
British Columbia	73,845	1,546
Yukon	1,454	123
Northwest Territories	2,779	200
Unclassifiable	109,777	.
Canada	**576,327**	**11,798**

6.2.2   Processing

For each of the sample TRs, the census documents were searched in order to identify the household enumerated at the address of the usual place of residence. A check was then made to see whether the person listed on the Form 1A, 3 or 3B was enumerated at his/her usual place of residence. A decision was reached regarding the enumeration of the TR in question. The various possible decisions are explained below:

(a) enumerated: when the person listed on the Form 1A, 3 or 3B was counted at his/her usual place of residence;

(b) dwelling imputed: when persons were imputed to the identified dwelling because of non-response;

(c) usual resident: when the person listed on the Form 1A, 3 or 3B had also been enumerated as a usual resident of the place in which he or she completed the special form;

(d) unoccupied dwelling: when the dwelling identified was listed as an unoccupied dwelling;

(e) not enumerated: when the person listed on the Form 1A, 3 or 3B was not counted at his/her usual place of residence;

(f) dwelling missed: when the dwelling was not enumerated;

(g) EA refused: when the dwelling identified was in an enumeration area (EA) that had refused to participate in the census;

(h) business: when the dwelling identified was not the TR's usual place of residence, but rather a business;

(i) undecided: when the EA of the usual place of residence could not be determined or there was significant doubt regarding the identification of the dwelling identified or the person sought.

A temporary resident was treated as enumerated in the census if the decision was "enumerated" (a), "dwelling imputed" (b), "usual resident" (c), or "unoccupied dwelling" (d). A TR for whom the dwelling was identified as "unoccupied dwelling" was not treated as missed because such persons were identified in the Vacancy Check and added to the official census counts. A TR for whom the dwelling was "imputed" was not treated as missed because it was assumed that, on average, the imputation procedure added the correct number of persons.

A temporary resident was treated as not enumerated in the census if the decision was "not enumerated" (e), "dwelling missed" (f) or "EA refused" (g). If the decision was "business" (h) or "undecided" (i), it was impossible to know whether the TR was enumerated in the census; such cases were therefore treated as non-response. Table 6.2 shows the distribution of the various decisions made.

Table 6.2   Decisions Made in Processing, 1991 Temporary Residents Study

Decision	Number (unweighted)	Percentage
(a) Enumerated	7,394	62.7
(b) Dwelling imputed	170	1.4
(c) Usual resident	148	1.3
(d) Unoccupied dwelling	234	2.0
(e) Not enumerated	1,397	11.8
(f) Dwelling missed	114	1.0
(g) EA refused	5	0.0
(h) Business	118	1.0
(i) Undecided	2,218	18.8
Total	**11,798**	**100.0**

6.2.3   Estimation and Adjustment of Census Data

For estimation purposes, TRs were divided into 24 **adjustment areas** according to their usual place of residence, and 22 **demographic groups** according to their age, sex and marital status. These two units were combined (adjustment area x demographic group) to obtain the estimation domains, of which there are 528. For example, single men between 15 and 24 living in the Montréal census metropolitan area (CMA) constitute one domain. The resulting estimates were then used to adjust the census data base.

The adjustment areas were delineated by separating most provinces into urban and rural areas. In addition, the CMAs of Montréal, Toronto and Vancouver constitute separate adjustment areas. The 24 adjustment areas are listed below:

Newfoundland rural
Newfoundland urban
Prince Edward Island
Nova Scotia rural
Nova Scotia urban
New Brunswick rural
New Brunswick urban
Quebec rural
Quebec urban (excluding Montréal)
Montréal
Ontario rural
Ontario urban (excluding Toronto)

Toronto
Manitoba rural
Manitoba urban
Saskatchewan rural
Saskatchewan urban
Alberta rural
Alberta urban
British Columbia rural
British Columbia urban (excluding Vancouver)
Vancouver
Yukon
Northwest Territories

The 22 demographic groups are as follows:

0-14 years, male	35-44 years, male, single
0-14 years, female	35-44 years, male, ever married
15-24 years, male, single	35-44 years, female, single
15-24 years, male, ever married	35-44 years, female, ever married
15-24 years, female, single	45-64 years, male, single
15-24 years, female, ever married	45-64 years, male, ever married
25-34 years, male, single	45-64 years, female, single
25-34 years, male, ever married	45-64 years, female, ever married
25-34 years, female, single	65 years and over, male, single
25-34 years, female, ever married	65 years and over, male, ever married
	65 years and over, female, single
	65 years and over, female, ever married

Processing of non-response was conducted in three stages, one for each type of non-response:

(a) unclassifiable forms;

(b) undecided cases;

(c) TRs not enumerated whose demographic group was unknown.

For the unclassifiable forms, the province of the temporary place of residence was known. From the sample, it was possible to estimate the distribution of provinces of usual place of residence for each province of temporary place of residence. Using this information, it was then possible to distribute unclassifiable forms to the provinces of usual place of residence. The sampling weights were then adjusted to take into account the distribution of unclassifiable forms by the province of usual place of residence.

Undecided cases were resolving by redistributing their weights among the resolved cases. Weight adjustment was conducted by adjustment area, meaning that within each adjustment area the weight of all resolved cases was multiplied by a common correction factor.

It was then necessary to impute to the missed TRs the characteristics required for determining their demographic group (age group, sex and marital status), in cases where these variables were unknown. Because of the low non-response rate for the sex variable, this variable was imputed separately from the other two. In most cases, the TR's first name was sufficient to determine the sex. The two other variables were then imputed using a donor imputation method.

Once the weighting and imputation were completed, the number of missed TRs was estimated for each estimation domain (adjustment area x demographic group). To adjust the census data to take account of missed TRs, a random additions procedure similar to that for the Vacancy Check was used. For every person who had to be added to a domain, an enumerated individual belonging to the same domain was selected at random and that person's weight was increased in the census data base by one.

6.3   Results

The main results of this study are presented in Tables 6.3 to 6.7. Table 6.3 shows estimates and rates of not enumerated TRs by province or territory. Table 6.4 shows the same estimates for the three major CMAs. In total, 16.1% of TRs were not enumerated in Canada during the 1991 Census. Ontario had the highest undercoverage rate for TRs (17.5%), and Prince Edward Island had the lowest (10.8%). Elsewhere in Canada, the rate varied between 13.9% and 17.5%. In the Montréal, Toronto and Vancouver CMAs, the undercoverage rate for TRs was 14.2%, 18.1%, and 20.0% respectively.

Table 6.5 shows estimates by age, sex and marital status. It should be noted that in almost every age/marital status category, more men were missed than women. In addition, single persons between 15 and 24 accounted for almost one third (32.2%) of all not enumerated TRs.

Table 6.6 shows the reduction in the rates of population undercoverage due to the temporary residents random additions by province or territory. The 92,584 not enumerated temporary residents represented 0.33% of Canada's population. At the provincial level, the reduction in undercoverage varied between 0.25% and 0.48%.

Finally, Table 6.7 shows the reduction in the rates of population undercoverage due to the temporary residents random additions by demographic group. For all age categories, single men were the most affected by undercoverage of temporary residents. The undercoverage rate was lowest for children under 15.

Table 6.3   Estimated Number of Not Enumerated Temporary Residents by Province/ Territory, 1991 Temporary Residents Study

Province/territory of usual place of residence	Total number of TRs	Not enumerated temporary residents			
		Estimated total	Standard error	Rate (%)	Standard error (%)
Canada	576,327	92,584	2,307	16.1	0.4
Newfoundland	16,268	2,621	344	16.1	2.1
Prince Edward Island	2,981	323	64	10.8	2.2
Nova Scotia	21,766	3,683	517	16.9	2.4
New Brunswick	15,615	2,459	344	15.7	2.2
Quebec	110,493	16,462	985	14.9	0.9
Ontario	176,977	30,920	1,379	17.5	0.8
Manitoba	27,521	4,098	412	14.9	1.5
Saskatchewan	34,602	4,808	452	13.9	1.3
Alberta	77,364	11,092	829	14.3	1.1
British Columbia	87,896	15,330	943	17.4	1.1
Yukon	1,676	345	89	20.6	5.3
Northwest Territories	3,168	443	96	14.0	3.0

1. The distribution of TRs by province of the usual place of residence was estimated using adjusted sampling weights to take account of unclassifiable forms in which the province of the usual place of residence was unknown.

Table 6.4   Estimated Number of Not Enumerated Temporary Residents for the Montréal, Toronto and Vancouver Census Metropolitan Areas, 1991 Temporary Residents Study

Census Metropolitan Area	Total number of TRs[1]	Not enumerated temporary residents			
		Estimated total	Standard error	Rate %	Standard error (%)
Montréal	43,186	6,145	614	14.2	1.4
Toronto	54,114	9,780	808	18.1	1.5
Vancouver	29,671	5,942	613	20.0	2.1

1. The distribution of TRs by CMA of the usual place of residence was estimated from the sample.

Table 6.5   Estimated Number of Not Enumerated Temporary Residents by Demographic Group, 1991 Temporary Residents Study

Age	Sex	Marital status	Number of not enumerated TRs	Standard error
0-14	Male	No restriction	2,565	410
	Female		1,844	356
15-24	Male	Single	18,551	1,118
	Male	Ever married	346	132
	Female	Single	11,298	864
	Female	Ever married	539	181
25-34	Male	Single	10,052	830
	Male	Ever married	6,243	657
	Female	Single	3,483	503
	Female	Ever married	3,018	466
35-44	Male	Single	2,638	422
	Male	Ever married	4,937	578
	Female	Single	927	256
	Female	Ever married	1,791	348
45-64	Male	Single	2,053	375
	--Male	Ever married	5,554	597
	Female	Single	486	161
	Female	Ever married	3,895	519
65+	Male	Single	703	216
	Male	Ever married	4,602	546
	Female	Single	397	155
	Female	Ever married	6,662	681
		Total	**92,584**	**2,307**

Table 6.6   Reduction in Rates of Population Undercoverage Due to Temporary Residents Random Additions, by Province/Territory, 1991 Temporary Residents Study

Province/territory	Rate[1] (%)	Standard error (%)
Canada	**0.33**	**0.01**
Newfoundland	0.45	0.06
Prince Edward Island	0.25	0.05
Nova Scotia	0.40	0.06
New Brunswick	0.33	0.05
Quebec	0.23	0.01
Ontario	0.30	0.01
Manitoba	0.37	0.04
Saskatchewan	0.48	0.04
Alberta	0.43	0.03
British Columbia	0.45	0.03
Yukon	1.19	0.31
Northwest Territories	0.73	0.16

1. The undercoverage rate is obtained by dividing estimates of not enumerated TRs by the number of persons who should have been enumerated, consisting of the census count plus net undercoverage estimates obtained from the 1991 Reverse Record Check and Overcoverage Study.

Table 6.7 Reduction in Rates of Population Undercoverage Due to Temporary Residents Random Additions, by Demographic Group, 1991 Temporary Residents Study

Age	Sex	Marital status	Rate[1] (%)	Standard error (%)
0-14	Male	No restriction	0.09	0.01
	Female		0.06	0.01
15-24	Male	Single	0.95	0.06
	Male	Ever married	0.35	0.13
	Female	Single	0.64	0.05
	Female	Ever married	0.23	0.08
25-34	Male	Single	0.82	0.07
	Male	Ever married	0.46	0.05
	Female	Single	0.41	0.06
	Female	Ever married	0.18	0.03
35-44	Male	Single	0.71	0.11
	Male	Ever married	0.26	0.03
	Female	Single	0.34	0.09
	Female	Ever married	0.09	0.02
45-64	Male	Single	0.94	0.17
	Male	Ever married	0.22	0.02
	Female	Single	0.28	0.09
	Female	Ever married	0.15	0.02
65+	Male	Single	0.72	0.22
	Male	Ever married	0.37	0.04
	Female	Single	0.27	0.11
	Female	Ever married	0.39	0.04
		Total	**0.33**	**0.01**

1. The undercoverage rate is obtained by dividing estimates of not enumerated TRs by the number of persons who should have been enumerated, consisting of the census count plus net undercoverage estimates obtained from the 1991 Reverse Record Check and Overcoverage Study.

VII. Reverse Record Check

7.1 Introduction

Since 1966, the Reverse Record Check (RRC) has made it possible to evaluate undercoverage in the census, that is, to estimate the number of persons and households that were not enumerated during the census. In 1991, for the first time, the RRC results were combined with those of the Overcoverage Study to calculate net undercoverage.

The main objectives of the 1991 RRC were:

(a) to study the effects of population undercoverage in the 1991 Census and to produce estimates of population undercoverage for provinces and territories and for certain large subgroups of the population;

(b) to obtain an indication of the level of household undercoverage in the 1991 Census;

(c) to study the characteristics of persons and households not enumerated with a view to identifying possible reasons for these errors.

Population and household undercoverage is generally considered to be one of the largest sources of error affecting census data. It introduces a downward bias to the extent that the census figures underestimate the true population and household totals. It may also distort the distribution of population and household characteristics calculated from census data if persons enumerated and persons not enumerated do not possess the same characteristics.

7.2 Methodology

The 1991 RRC target population was the same as that of the 1991 Census: all persons living in Canada on June 4, 1991, Canadian diplomatic and military personnel enumerated abroad and persons on Canadian vessels. The RRC sample thus consisted of persons who should have been enumerated in the 1991 Census, and was selected from sources independent of the current census. Shortly after the census, a number of tracing operations were undertaken to determine the address of each selected person (SP) on Census Day (June 4, 1991). This was followed by a search of 1991 Census documents to determine whether or not these persons had been enumerated.

These tracing and searching operations led to the final classification of each SP as either "enumerated", "missed", "deceased", "emigrated", "abroad", "out-of-scope" or "not traced". These sample results were then weighted up to the population level.

The methodology of the 1991 RRC was similar to that used for previous censuses, but with three major differences. For the first time, Yukon and the Northwest Territories were included in the study. In addition, to reflect the inclusion of a new population in the census, the RRC target population included non-permanent residents, that is, persons holding student or employment authorizations, Minister's permits (including extensions) and persons claiming refugee status. Finally, the sample size was considerably larger than in previous RRCs.

7.2.1 Sampling Frame Construction and Sample Selection

The target population, which contains all persons who should have been enumerated in the 1991 Census, was constructed from six basic sampling sources or frames. The first five frames were used to estimate undercoverage in the 10 provinces, whereas the estimates for the two territories were calculated on the basis of samples from the last frame only. A total of 55,912 persons were selected for the sample, distributed as follows:

Table 7.1   Sampling Frames, 1991 Reverse Record Check

Sampling frame	Definition	Sample size (persons)
Census	All persons enumerated in the 1986 Census	45,300
Births	All children born between June 3, 1986 and June 3, 1991	2,344
Immigrants	All landed immigrants who entered Canada between June 3, 1986 and June 3, 1991	1,447
Persons not enumerated	All persons not enumerated in the 1986 Census	1,522
Permit holders and refugees	All persons holding employment or student authorizations, Minister's permits (including extensions) and persons claiming refugee status who were in Canada on June 4, 1991	799
Health care files	All persons registered in the health care files of Yukon and the Northwest Territories on June 4, 1991	4,500
Total		**55,912**

Sampling was carried out independently within each frame. The sample design varied from frame to frame, depending on the nature of the list used. The sampling rates within frames were not uniform. Higher rates were used in certain subgroups for which high undercoverage was expected, in order to improve the sample design.

The census frame was first divided by 1986 Census enumeration area (EA). These EAs were then stratified by 1986 province of residence, method of enumeration (mail-back, pick-up, canvasser) and by size of municipality. A two-stage sample was selected within each stratum, in order to minimize the cost of certain subsequent operations. For the first stage, a sample of EAs was selected with probability proportional to EA population size. Within each selected EA, persons were ordered by age and sex and a systematic sample of approximately 10 persons was selected. Persons aged 15 to 19 in 1986, that is, those aged 20 to 24 in 1991, had a probability of selection twice that of other persons, because it had been observed in previous RRCs that undercoverage was greater for that age group.

For the birth frame, copies of all birth registrations for the intercensal period were available from Vital Statistics within Statistics Canada. The frame was then stratified by province of residence and year of birth. The immigrant frame was derived from records maintained by Employment and Immigration Canada and stratified by year of arrival in Canada. For these two frames, systematic samples were selected from within each stratum. Probability of selection was greater for children born in 1990 or 1991 and for immigrants who arrived in Canada during those two years.

The persons not enumerated frame is a conceptual sampling frame since there exists no list of all persons not enumerated in the 1986 Census. The sample from that frame consists of all cases classified as "persons not enumerated" in the 1986 RRC. The sample is not stratified as such, although there is an implicit stratification since cases missed in 1986 came from different frames and strata in the 1986 RRC.

The permit holder and refugee frame was also supplied by Employment and Immigration Canada. The frame was stratified by type and duration of permit for permit holders. Refugees formed a stratum on their own. Again, systematic samples were selected within each stratum.

Finally, age, sex, area (urban or rural) and, for the Northwest Territories only, aboriginal status were used to form strata within the Health Care files of each of the territories. Systematic samples were selected within the strata.

7.2.2 Tracing, Searching and Classification Operations

The purpose of the various RRC operations was to classify each SP as one of the following:

(a) enumerated in the 1991 Census;

(b) not enumerated in the 1991 Census;

(c) died before the 1991 Census;

(d) emigrated before the 1991 Census.

(e) abroad before the 1991 Census;

(f) out-of-scope, that is, the SP should not be included in the 1991 Census (for example, babies born after June 4, 1991, permit holders who were no longer in Canada);

(g) not traced, that is, it could not be determined whether the SP was part of the census target population or what the SP's usual place of residence was on Census Day.

The operations necessary to achieve this classification can be broken down into two types of operations, which were conducted on an alternating basis: tracing and searching. The purpose of tracing was to establish the address of the SP on Census Day 1991, while searching consisted of verifying 1991 Census documents (visitation records and questionnaires) and the data base to determine whether the SP was in fact listed on a questionnaire and was on the data base.

Since addresses obtained at the time of selection of the sample dated for the most part from the 1986 Census and were thus in many cases out of date, a tracing operation was first undertaken for samples that were available before the 1991 Census. The tracing consisted of a computer linkage to administrative files in an effort to update the SP's address. In cases where there was a match, the linkage made it possible to obtain an address that dated from early 1990.

This tracing was followed by a manual searching operation carried out as part of regional office processing for the 1991 Census, to determine whether the SP had been enumerated at the address obtained in the previous operation. Approximately four fifths of the total sample were sent for processing. Matched cases were classified as "enumerated" and considered closed. These represented approximately 53% (25,637 cases) of all cases sent for processing.

For cases that were not found on a questionnaire or could not be sent for processing because they were selected late, tracing and telephone interview was carried out from Statistics Canada's regional offices. The interviewers tried to contact the SP (or, in the case of a child, an adult responsible for the SP) or, if this was not possible, to speak with a person in the same household or who knew the SP well enough to be able to complete the questionnaire. The interviewers collected information on the SP's address on June 4, 1991 and other possible addresses where the SP might have been enumerated, characteristics about the SP's household and dwelling and sociodemographic and economic characteristics. The information obtained through telephone tracing made it possible to classify SPs as either contacted, deceased, emigrated, abroad, out-of-scope or not traced.

For all contacted cases in which an SP was traced by telephone to one or more possible 1991 Census addresses, another search of 1991 Census documents was undertaken to determine whether the SP had in fact been enumerated at one of the traced address(es). These searches were conducted as part of the head office processing operations of the census. The search operations comprised three parts: first, automated conversion of the address(es) to enumeration area(s); second, an automated search for the SP's characteristics (date of birth and sex) in the census data base, using the EAs identified in the first stage; and finally, a manual search in the questionnaires identified to determine whether the SP's name and address appeared. Following these searches, SPs were classified as enumerated or not found.

For cases in which the SP could not be found at any of the available addresses (those obtained through telephone interview, the address of selection and the address sent for processing, if different), and for cases not traced before the search, a final trace was made in administrative records in a last attempt to obtain SPs' new addresses. If this attempt was successful, a search for the SP was made in the census questionnaire corresponding to the new address.

Following all these stages, SPs were classified into one of the seven categories, namely enumerated, not enumerated, deceased, emigrated, abroad, out-of-scope or not traced.

Before proceeding with the final processing stages and estimates, SPs' classifications were verified. For "enumerated" cases, the SP's name, date of birth and sex had to appear in a questionnaire and there had to be a record for that person in the census data base. Cases classified "enumerated" were therefore matched against the census data base to confirm that they had been enumerated.

For "not enumerated" cases, it had to be confirmed that the person was alive in Canada on Census Day but did not appear in any of the census questionnaires corresponding to the traced addresses. A detailed review was done of all "not enumerated" cases to ensure that all possible addresses had been obtained and searched.

For "deceased" cases, a search of the death register (available within Statistics Canada) was carried out to verify that these persons had in fact died prior to June 4, 1991. In a number of cases where there was still some uncertainty, a search was conducted at the last traced address of residence as obtained through telephone tracing. No verification could be carried out for SPs classified as "having emigrated prior to June 4, 1991", since no emigration records exist in Canada. Persons were classified in that category only if the source of information was deemed to be reliable. Finally, a search of the last known address of residence in Canada was undertaken for "abroad" cases to ensure that these persons had not been listed at that address by other persons.

A number of cases were reclassified on the basis of these verifications. Table 7.2 shows the final sample distribution by category and frame of selection.

Of the 55,912 SPs initially selected for the sample, 2,341 (4.2% of the sample) were not enumerated in the 1991 Census, while 48,227 (86.3%) were enumerated. In addition, 2,752 (4.9%) were not traced. The remaining 2,592 (4.6%), who were either deceased or no longer residing in Canada (emigrated or abroad) represented the sample attrition. It should be noted that these figures are gross results, before weighting, and do **not** represent the census coverage and undercoverage rates.

7.2.3 Final Data Processing and Estimation

The final processing of the data collected and results of searches was carried out in four main steps:

(a) capture and edit of certain data for not enumerated persons;

(b) imputation of item non-response for the RRC questionnaire;

(c) weight adjustments;

(d) calculation of final estimates of undercoverage and standard errors.

The first two steps were carried out toward the end of the verification of the classification, whereas the last two were done once the classification had been finalized.

During the telephone interview, a series of questions similar to certain census questions were asked, in order to calculate estimates of undercoverage for various population and household subgroups. During the first two steps of the final processing, the answers to these questions were captured and edited for missed SPs only. In cases where values were missing from one or more of the questions, imputation was conducted. The non-response rate to these questions was generally quite low; the highest rate was 3.4%.

Table 7.2   Number of Cases in Each Final Category by Frame, 1991 Reverse Record Check[1]

Sampling frame	Census frame		Birth frame		Immigrant frame		Not enumerated frame		Non-permanent resident frame		Health care file frame		Total	
Classification of selected persons	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Enumerated	39,832	87.9	2,115	90.2	1,056	73.0	1,078	70.8	324	40.6	3,822	84.9	48,227	86.3
Not enumerated	1,613	3.6	76	3.2	113	7.8	187	12.3	125	15.6	227	5.0	2,341	4.2
Deceased	1,938	4.3	23	1.0	4	0.3	46	3.0	0	0.0	0	0.0	2,011	3.6
Emigrated/abroad/out-of-scope	361	0.8	20	0.9	69	4.8	49	3.2	50	6.3	32	0.7	581	1.0
Not traced	1,556	3.4	110	4.7	205	14.2	162	10.6	300	37.5	419	9.3	2,752	4.9
Total	**45,300**	**100.0**	**2,344**	**100.0**	**1,447**	**100.0**	**1,522**	**100.0**	**799**	**100.0**	**4,500**	**100.0**	**55,912**	**100.0**

1   These figures are gross results, before weighting, and do not represent the census coverage and undercoverage rates.

The third step comprised two weight adjustment procedures. The first was an adjustment to take account of total non-response to the study, that is, persons not traced. This consisted of redistributing the original weight (the inverse of the probability of selection) of cases not traced to those cases that were traced. The second weight adjustment ensured consistency with known population totals of the sampling frames. For both adjustments, separate adjustments were done within each of a number of subgroups which were defined in terms of certain information available at the time of selection, such as province of selection, age or year of birth, and sex.

Estimates of population undercoverage were then obtained by summing the adjusted weights. Estimates of household undercoverage were obtained by calculating household weights for those not enumerated persons in private households that were completely missed. The household weight was calculated by dividing the final person weight of the not enumerated person by the number of persons in the household. This reflects the fact that the larger the household, the greater the probability it will be included in the sample.

The population undercoverage rate $\hat{R}_U$ was calculated as follows:

$$\hat{R}_U = \frac{\hat{M} - \hat{VC} - \hat{TR}}{C + (\hat{M} - \hat{VC} - \hat{TR}) - \hat{O}}$$

where

$\hat{M}$ is the estimate of the number of persons not enumerated at their usual place of residence, as obtained from the 1991 RRC;

C is the published census count for the 1991 Census;

$\hat{VC}$ is the estimate of the number of persons not enumerated because they occupied dwellings classified by the Census Representative as unoccupied, as obtained from the Vacancy Check;

$\hat{TR}$ is the estimate of the number of temporary residents (TRs) not enumerated at their usual place of residence, as obtained from the Temporary Residents Study; and

$\hat{O}$ is the overcoverage estimate, as obtained from the Overcoverage Study.

The Reverse Record Check estimates $\hat{M}$, the <u>total number</u> of persons not enumerated at their usual place of residence. From this, it is necessary to subtract estimates $\hat{VC}$ and $\hat{TR}$, since the published census count already includes the estimates of not enumerated persons from the Vacancy Check and the Temporary Residents Study.

7.3 Results

The results of the 1991 Reverse Record Check are presented in Tables 7.3 and 7.4. Table 7.3 presents estimates of population undercoverage, while Table 7.4 shows estimates of undercoverage of private households. They contain estimates of the number $\hat{M} - \hat{VC} - \hat{TR}$ of persons or private households not enumerated and the rate $\hat{R}_U$ of undercoverage. Each estimate is accompanied by its standard error.

For Canada, **population** undercoverage was estimated at 3.43% with a standard error of 0.12%. Among the 10 provinces, Ontario and New Brunswick had the highest undercoverage rates, at 4.23% and 3.71% respectively. The highest rate for Canada as a whole, however, was in the Northwest Territories, which had a rate of 5.73%. Prince Edward Island and Saskatchewan had the lowest rates, at 1.67% and 2.15% respectively.

The estimated undercoverage rate for **private households** for Canada was 2.66% with a standard error of 0.13%. Among the provinces and territories, the highest rate is that of the Northwest Territories, at 4.13%. Among the 10 provinces, Ontario has the highest rate (3.60%), followed by Newfoundland, Quebec and British Columbia with rates of approximately 2.5%. The lowest rates are in Prince Edward Island and Saskatchewan (1.1%).

Table 7.3   Estimated Population Undercoverage for Canada, the Provinces and Territories, 1991 Reverse Record Check

Province/territory	Number of persons not enumerated		Population undercoverage rate	
	Estimated number	Standard error	Estimated rate %	Standard error %
Canada	**965,174**	**36,539**	**3.43**	**0.12**
Newfoundland	14,349	1,772	2.47	0.30
Prince Edward Island	2,187	306	1.67	0.23
Nova Scotia	20,612	3,380	2.25	0.36
New Brunswick	27,738	3,260	3.71	0.42
Quebec	224,974	14,487	3.18	0.20
Ontario	442,933	31,329	4.23	0.28
Manitoba	25,689	4,125	2.31	0.36
Saskatchewan	21,618	3,329	2.15	0.32
Alberta	65,106	7,203	2.51	0.27
British Columbia	115,287	8,442	3.42	0.24
Yukon	1,190	176	4.12	0.58
Northwest Territories	3,491	372	5.73	0.57

Table 7.4   Estimated Private Household Undercoverage for Canada, the Provinces and Territories, 1991 Reverse Record Check

Province/territory	Number of private households not enumerated		Private household undercoverage rate	
	Estimated number	Standard error	Estimated rate %	Standard error %
Canada	**272,198**	**13,912**	**2.66**	**0.13**
Newfoundland	4,615	569	2.59	0.31
Prince Edward Island	494	223	1.10	0.49
Nova Scotia	4,934	1,456	1.50	0.43
New Brunswick	5,443	1,030	2.11	0.39
Quebec	66,957	7,463	2.49	0.27
Ontario	134,998	11,392	3.60	0.29
Manitoba	6,311	2,159	1.54	0.52
Saskatchewan	4,013	1,425	1.10	0.38
Alberta	11,517	2,371	1.25	0.25
British Columbia	31,893	3,584	2.51	0.27
Yukon	331	72	3.23	0.68
Northwest Territories	692	134	4.13	0.76

VIII.   Overcoverage Study

8.1   Introduction

Overcoverage in the census occurs when persons are counted more than once, or persons not in the census target population, such as fictitious persons, pets or foreign visitors, are enumerated. The purpose of the 1991 Overcoverage Study (OCS) was to estimate the number of persons and private households overcovered during the 1991 Census.

Prior to 1986, there had been no study to measure overcoverage. As part of the 1986 Census, an experimental study was carried out to obtain an approximate estimate of the level of overcoverage. For the 1991 Census, the objective was to produce reliable estimates of overcoverage which, when combined with estimates of undercoverage from the Reverse Record Check, would yield estimates of net undercoverage for the first time.

The target population of the OCS was all persons who were enumerated in Canada in the 1991 Census. Persons outside Canada (abroad or on ships) were excluded because the census itself already included an overcoverage check for these persons. One of the census questions put to these persons asked the addresses in Canada at which they might have been enumerated. These addresses were then verified during regular census data processing to ensure that the persons were only counted once.

8.2   Strategy

Duplicate enumerations can be caused by factors related to the respondent, such as moving close to Census Day or having more than one residence (e.g., cottage, student in school residence). As well, procedural errors such as delivering two census questionnaires to the same dwelling can result in overcoverage. In the 1991 OCS, separate methodologies were implemented to identify these different sources of error. The methodology for the 1991 OCS included three components:

1.   a study of a sample of persons enumerated in the census in private dwellings, to determine if the persons listed on the census forms should have been enumerated (i.e. included in the census target population) and to obtain alternative addresses for possible double counting;

2.   a collective dwelling study of a sample of persons counted as usual residents in collective dwellings such as student residences, work camps, hospitals, etc., to obtain alternative addresses for possible double counting; and

3.   an automated match study, which consisted of an automated search of the census database to identify duplicate inclusions of households and persons, by matching all households in a defined area on their members' sexes and dates of birth.

The private dwelling study was also used as a vehicle to evaluate the quality of the responses to selected census questions on language, ethnic origin and marital status.

The first study involved going back to a sample of private households two months after the completion of census collection and conducting interviews to obtain the information necessary to identify overcoverage. Data collection for the collective dwelling study took place at the same time as the census enumeration. For the automated match study, there were no questionnaires or field work. The data were taken directly from the census database.

8.3 Private Dwelling Study

8.3.1 Stratification, Sample Selection and Data Collection

The target population of this study included all persons enumerated in private dwellings. In order to control the costs of data collection, private dwellings enumerated on Indian reserves or in areas with the canvasser method of enumeration were excluded from the study. The sampling frame thus covered 99% of the total population in private dwellings.

The EAs were divided into strata that were similar to those used for the census frame for the Reverse Record Check. EAs were stratified by province and territory and then further stratified by 1991 method of enumeration and the estimated size of the urban area prior to the census. EAs consisting of only large collectives dwellings, EAs on Indian reserves and EAs with the canvasser method of collection were excluded. Two-stage sampling was used within each stratum. For the first stage, a sample of 2,000 EAs was selected randomly. Within each selected EA, a sample of 15 occupied private dwellings was selected from the visitation records. If the EA contained less than 15 dwellings, then all of them were selected.

A sample of 29,516 households was selected. Names, addresses, telephone numbers, dates of birth, sex and other information reported by the selected households on their census questionnaires were transcribed onto survey questionnaires.

Two months after the end of census data collection, the selected households were contacted by telephone. They were asked questions to determine if the persons listed on the census questionnaire were in fact part of the census target population and to obtain any alternative addresses where they might have been enumerated. Households that had moved since the census and those that could not be contacted by telephone were traced and followed up by a personal visit.

8.3.2 Processing

Processing for the private dwelling study was done in three stages: matching and analysis, address search and weighting.

The selection of households was carried out immediately after census data collection, but before any census edits and corrections to the questionnaires. In some cases, persons that had not been originally listed on a census questionnaire and were therefore not selected for the study were later added to a census questionnaire based on comments on the questionnaire or in the Visitation Record. These persons were identified by matching the sample to the census database (EA number, household number, sex and date of birth). This operation identified 103 such persons. They were treated as non-response. The analysis of the survey data identified 672 households that were not contacted or had refused to respond, as well as 115 individual persons for which there were no data collected. They were also treated as non-response.

The data were also analyzed to identify the persons who were counted in the census although they were not part of the census target population. Twenty-two such persons were found and were treated as overcoverage.

A total of 76,329 persons were contacted and matched to the census database (i.e. enumerated once at their address of selection). These persons reported 11,122 alternative addresses where they might have been enumerated. A search of the census questionnaires completed at the addresses reported was carried out to determine whether or not the persons were enumerated at two different places. This stage of processing identified 397 persons who had been counted at two different locations during the census. Of the 11,122 alternative addresses, 3,441 were not specific enough and were therefore treated as non-response. Table 8.1 shows the distribution of the final sample and the number of overcoverage cases by province or territory.

The final processing step consisted of two weight adjustments. Each household that responded to the study was assigned an original weight equal to the inverse of its probability of selection. A first adjustment took into account the person level non-response. It ensured that the weights assigned to each person were consistent with known census counts. The second adjustment took into account the address level non-response. The alternative addresses were assigned the adjusted weights of the persons reporting them. Then the weights of the non-response addresses were redistributed among the response addresses within certain subgroups defined by the type of alternative address (e.g., mover address, address at school, address of a vacation home), the age of the person reporting the address and the relationship of that person to the first person in the selected household (immediate family such as spouse or child, other family such as parent, in-law or grandchild, and unrelated person such as room-mate or lodger).

Estimates of population overcoverage were then obtained by summing the adjusted weights. Estimates of household overcoverage were obtained by applying similar weighting and adjustment procedures to cases where whole households were overcovered.

8.4 The Collective Dwelling Study

8.4.1 Stratification, Sample Selection and Data Collection

This study covered all persons who were enumerated as usual residents in a collective dwelling. The study, which covered only three types of collective dwellings in 1986, was extended to cover all types in 1991. The collective dwellings were divided into two groups: institutional dwellings such as hospitals or jails, and non-institutional dwellings such as hotels, YMCAs and school residences.

A list of all institutional collective dwellings was obtained prior to the census. This list was stratified by province and territory and by specific collective type. Within each stratum, the dwellings were sorted by estimated number of usual residents (usually the number of residents from the 1986 Census) and a systematic sample was selected. A sample of 562 dwellings was selected.

During the enumeration of collective dwellings on June 4, 1991, the census representatives for the sampled dwellings completed both the census and the study questionnaires, using information from the institutions' administrative files. Basic demographic characteristics and names of usual residents were transcribed onto the study questionnaires which also asked for alternative home addresses.

Persons who were enumerated as usual residents in a non-institutional collective dwelling completed a special census form on which they were asked to report any other address where someone may have included them on their census questionnaire. Those who reported an address were stratified by province. Within each stratum, the persons were sorted by specific type of collective dwelling and a systematic sample was selected. A sample of 1,111 usual residents was selected.

8.4.2 Processing

The data were processed through steps similar to those applied to the private dwelling study.

The data were matched to the census database and analyzed. At this step, 293 of the 562 selected institutions were classified as out-of-scope because the information on the sampling list frame was outdated. The dwellings either did not have any usual residents, did not exist, were not collective dwellings or were not institutions. Another 98 institutions were treated as non-response. They either did not have any alternative addresses on their administrative files or were not processed correctly at the data collection stage. The remaining 171 institutions contained 6,690 persons, of which 145 persons had insufficient data and were treated as non-response. A total of 5,716 alternative addresses were reported for the remaining persons. There were 403 persons counted at both the institution and the alternative address (usually a private dwelling). A total of 605 addresses were too vague and their census questionnaires could not be found. They were treated as non-response.

In the non-institutional component, 336 persons were found counted at both the collective dwelling and the alternative address. Fifty-four of the 1,111 addresses were too vague and were treated as non-response.

In both components, each person was assigned a weight equal to the inverse of the probability of selection. Persons with vague addresses were treated as non-response. They were removed from the sample and the weights of the remaining persons were adjusted accordingly. In the institutional component, the weights were also adjusted to ensure consistency with known census counts at the provincial level.

Table 8.1 shows the distribution of the final sample and the number of overcoverage cases detected in each component.

8.5   The Automated Match Study

8.5.1   Methodology

The goal of this study was to detect households and persons that were counted more than once within the same EA. A sample of EAs was selected and processed through an automated matching program that detected pairs of households with similar characteristics. The results of the matching operation were used to stratify the selected EAs according to the likelihood that they contained some overcoverage. Within each stratum, a subsample of EAs was selected. Within each subsampled EA, a sample of pairs of households was selected and their census questionnaires were verified to determine whether or not there was overcoverage (i.e. the same persons listed on both questionnaires).

8.5.2   Sample Design and Processing

The EAs were grouped into two categories: those covered by the sampling frame used for the private dwelling study, and the others. All the EAs in the latter category were selected for the automated matching operation. In the former category, the EAs were stratified by region (Atlantic, Quebec, Ontario, Prairies, British Columbia and the two territories) and a random sample was selected within each stratum. An overall sample of 9,465 EAs was selected for the matching operation.

Each selected EA was processed through a matching operation that identified each pair of households with similar characteristics. Similarity was based on the household member's date of birth and sex. The pairs of households were classified according to the likelihood that they represented overcoverage. As an example, a pair of households with four members having exactly the same characteristics had a much higher chance of representing overcoverage than a pair of households with just one member with the same characteristics. Among the EAs matched, 2.8 million pairs of households had a reasonable chance of representing overcoverage. Pairs with no similar members were not considered further.

The 9,465 EAs were then stratified according to the likelihood that they contained overcoverage, based on the results of the automated match. Within each stratum, a subsample of EAs was selected for verification. The size of this subsample was 2,292 EAs. Within each selected EA, a sample of pairs of households was selected and their census questionnaires were checked to determine if the same persons were listed on both of them. A total of 14,901 pairs of households were verified and 2,875 persons in 1,037 pairs of households were found counted on two census questionnaires. These persons were weighted according to the sampling design.

Table 8.2 shows the number of EAs matched, the number of EAs verified, the number of pairs of households verified and the number of persons found on two census questionnaires.

8.6 Results

The population overcoverage $\hat{O}$ was obtained by summing the overcoverage estimate from each component. The population overcoverage rate $\hat{R}_o$ was calculated as follows:

$$\hat{R}_o = \frac{\hat{O}}{C + (\hat{M} - \hat{VC} - \hat{TR}) - \hat{O}}$$

where $\hat{M}$, C, $\hat{VC}$ and $\hat{TR}$ are as defined in Chapter 7. Rates of overcoverage for private dwellings were calculated in a similar fashion, except that the component $\hat{TR}$ is not included since Temporary Resident random additions were not included in the household universe. The results are shown in Tables 8.3 for population and 8.4 for households.

At the national level, the number of persons overcovered was estimated to be about 158,000, which represents slightly more than one half percent of the population. Among the provinces, Prince Edward Island, Alberta and British Columbia had overcoverage rates above the national average, while the remaining Atlantic and Prairie provinces had rates below the average. Ontario and Quebec were both close to the national average.

For private households, the overall rate of overcoverage was slightly less than one half percent. The rates for Ontario and Quebec were the highest. Rates for the territories should be viewed with caution since the numbers involved are very small.

Table 8.1   Distribution of Sample and Number of Overcoverage Cases in Each Study Component, 1991 Overcoverage Study

Province/territory	Private dwellings		Institutional collectives		Non-institutional collectives	
	Number of persons in sample	Cases of overcoverage	Number of persons in sample	Cases of overcoverage	Number of persons in sample	Cases of overcoverage
Canada	76,329	419	6,545	403	1,057	336
Newfoundland	4,627	29	261	35	58	21
Prince Edward Island	4,601	31	138	11	10	2
Nova Scotia	5,036	20	472	17	80	27
New Brunswick	4,717	23	410	41	58	13
Quebec	12,590	79	1,082	129	205	66
Ontario	15,533	87	884	57	218	65
Manitoba	5,171	22	708	31	81	35
Saskatchewan	5,355	28	458	17	54	21
Alberta	7,475	43	1,847	48	118	35
British Columbia	8,750	47	226	13	123	36
Yukon	1,154	6	31	1	27	7
Northwest Territories	1,320	4	28	3	25	8

Table 8.2   Distribution of Sample Size and Number of Overcovered Persons Detected in the Automated Match Study

Province/territory	Sample size			Number of persons found overcovered
	Number of EAs matched	Number of EAs verified	Number of pairs verified	
Canada	9,465	2,292	14,914	2,875
Newfoundland	394	109	599	111
Prince Edward Island	102	102	325	40
Nova Scotia	515	151	837	118
New Brunswick	507	119	682	115
Quebec	1,638	400	2,639	473
Ontario	1,958	400	2,855	788
Manitoba	485	104	648	114
Saskatchewan	672	100	405	34
Alberta	897	196	1,213	143
British Columbia	2,086	400	2,782	845
Yukon	92	92	360	16
Northwest Territories	119	119	1,569	78

Table 8.3   Estimated Population Overcoverage for Canada, the Provinces and Territories, 1991 Overcoverage Study

Province/territory	Number of persons overcovered		Population overcoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Canada	157,920	10,330	0.56	0.04
Newfoundland	2,783	517	0.48	0.09
Prince Edward Island	967	200	0.74	0.15
Nova Scotia	3,283	809	0.36	0.09
New Brunswick	3,458	694	0.46	0.09
Quebec	40,501	5,224	0.57	0.07
Ontario	61,829	7,693	0.59	0.07
Manitoba	4,998	1,249	0.45	0.11
Saskatchewan	3,512	766	0.35	0.08
Alberta	13,281	2,274	0.51	0.09
British Columbia	23,051	3,388	0.68	0.10
Yukon	83	19	0.29	0.07
Northwest Territories	175	45	0.29	0.07

Table 8.4   Estimated Private Household Overcoverage for Canada, the Province and Territories, 1991 Overcoverage Study

Province/territory	Number of private households overcovered		Private household overcoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Canada	45,455	3,704	0.44	0.04
Newfoundland	603	170	0.34	0.09
Prince Edward Island	216	52	0.48	0.11
Nova Scotia	613	337	0.19	0.10
New Brunswick	590	178	0.23	0.07
Quebec	13,450	2,153	0.50	0.08
Ontario	19,073	2,623	0.51	0.07
Manitoba	1,284	441	0.31	0.11
Saskatchewan	853	282	0.23	0.08
Alberta	3,594	767	0.39	0.08
British Columbia	5,150	1,078	0.41	0.08
Yukon	14	5	0.14	0.05
Northwest Territories	16	0	0.10	0.00

IX. Net Undercoverage Results

As described in Chapter 4, net undercoverage is the difference between undercoverage and overcoverage. The production of estimates of overcoverage from the 1991 Overcoverage Study, combined with estimates of undercoverage from the 1991 Reverse Record Check, has made it possible to produce estimates of net undercoverage for the first time.

This chapter presents estimates of net undercoverage for a variety of census characteristics. The tables in this chapter show the estimated net undercoverage, its estimated standard error, the net undercoverage rate, and its standard error for each characteristic listed. Table 9.1 gives estimates for persons and Table 9.2 gives estimates for private households.

9.1 Population Net Undercoverage

Province or Territory of Residence in 1991

Among the 10 provinces, net undercoverage rates were highest in Ontario (3.64%) and New Brunswick (3.25%). The highest rates overall were found in the two territories, with the Northwest Territories having an estimated net undercoverage rate of 5.44%. Prince Edward Island, at 0.93%, and Saskatchewan, at 1.80%, had the lowest estimated rates.

Urban/Rural Distribution and Urban Area Size

Overall, net undercoverage was higher in rural areas (3.25%) than in urban areas (2.76%). The higher rate in rural areas was largely because of incompletely enumerated Indian reserves, which are almost completely in rural areas. When these reserves are excluded, the rate for rural areas is almost the same as the rate for urban areas. Among urban areas of different sizes, rates were similar except for a slightly lower rate in the 30,000 to 99,999 category.

Census Metropolitan Areas

The net undercoverage rate in census metropolitan areas was very close to the national average and did not vary significantly across the urbanized core, urban fringe, and rural fringe components. Among CMAs, Toronto had the highest net undercoverage rate.

Age Groups and Sex

The net undercoverage rate for males (3.37%) was about a percentage point higher than the rate for females (2.39%). For males, the highest rates of net undercoverage occurred in the 20 to 24 years and the 25 to 34 years age groups, reaching 7.75% and 6.76% respectively. The pattern is similar for females, with rates for these same age groups being higher than average. Females in the 0 to 4 year old category had an unusually high rate (3.75%). However, this was likely due to sampling error and the true rate was probably closer to that for males in the same age group.

Marital Status and Sex

The highest rates of net undercoverage occurred among never-married persons 15 years of age and over (5.98%) and among divorced persons (3.85%). In fact, the overall difference of one percentage point between males and females is largely explained by these two categories. For never-married males 15 years of age and over, the net undercoverage rate was 6.83%, compared to 4.96% for females in the same group. For divorced males, the rate was 7.11% compared to 1.20% for divorced females.

Common-law Status

As might be expected, rates of net undercoverage were higher than average for persons living in common-law situations. Males living common law had an estimated net undercoverage rate of 6.38%, compared to 3.37% for all males. For females living common law, the net undercoverage rate was 4.27%, compared to 2.39% for all females.

Mother Tongue

There were no significant differences in the rates of net undercoverage between those reporting English as their mother tongue (2.49%) and those reporting French (2.48%) as their mother tongue. However, among those reporting a non-official language as their mother tongue, the rate almost doubled (4.85%). The rates for persons with Italian or German as their mother tongue were lower than the national average, while rates for persons with Chinese or another language as their mother tongue were considerably higher.

Knowledge of Official Languages

The lowest rate of net undercoverage was found among persons reporting only a knowledge of French (2.10%). Persons without a knowledge of either English or French had a much higher than average rate of net undercoverage (10.92%).

Home Language

The pattern was similar to that observed for mother tongue. The lowest rates of net undercoverage were among those speaking English, French, Italian or German at home. The highest rates of net undercoverage were among those speaking Chinese (6.24%) or another language (6.48%) at home.

Tenure

Persons who rented their home had a higher rate of net undercoverage (5.09%) than persons who owned their home (1.59%). The highest rate occurred for the category "Band housing." This is largely attributable to incompletely enumerated Indian reserves, where the tenure is frequently band housing. Persons in collective dwellings also had a high rate of net undercoverage.

Mobility (One-year and Five-year)

Net undercoverage rates are related to mobility. Persons who lived in the same dwelling on Census Day 1991 as they did one year prior to the census had the lowest undercoverage rate. Persons who were outside Canada one year prior to the 1991 Census had the highest net undercoverage rate. The pattern was similar for five-year mobility.

Income in 1990

The highest rate of net undercoverage was among persons with no income or a negative income (loss) at 5.65%. Net undercoverage rates declined as income increased.

Work Status in 1990

The net undercoverage rates did not differ significantly overall between persons who worked full time (2.87%) or part time (2.59%), but net undercoverage was higher for persons who did not work at all in 1990 (3.52%). Net undercoverage was also higher for persons who only worked part of the year (1 to 48 weeks), at 3.62%, than for persons who worked the entire year (49-52 weeks), at 2.26%. Within each of the full-year/part-year categories, however, full-time workers had higher net undercoverage rates than part-time workers.

9.2 Private Household Net Undercoverage

Province of Residence in 1991

Ontario had the highest net undercoverage rate (3.09%) of the 10 provinces, followed by Newfoundland (2.25%), although the latter did not differ significantly from the national average. Prince Edward Island had the lowest estimated rate at 0.62%.

Urban/Rural Distribution and Urban Area Size

The rates of net undercoverage for households were not significantly different between urban and rural areas nor across the various urban size groups. When incompletely enumerated Indian reserves are excluded, however, the rate in rural areas drops to about 1.7%.

Census Metropolitan Areas

The net undercoverage rate in urbanized core areas of CMAs was higher than in rural fringe areas, although the difference was barely significant. Toronto and Ottawa-Hull had the highest rates among specific CMAs, although the sampling error for Ottawa-Hull was substantial.

Tenure

The rate of net undercoverage was significantly higher for households that rented their accommodation (4.47%) than for households that owned their home (0.73%). In fact, over three-quarters of the total net undercoverage was accounted for by renter households. The highest rate occurred in the "Other" category (19.37%) and was largely due to incompletely enumerated Indian reserves. However, the actual amount of net undercoverage contributed by this category is small.

Type of Dwelling

The highest rates of net undercoverage were found among duplexes (8.32%) and other single-attached dwellings (10.52%), although the sampling error on the latter was substantial. Single-detached dwellings, although they had a lower-than-average net undercoverage rate (1.68%), still accounted for over 40% of the total net undercoverage.

Table 9.1 Estimated Population Net Undercoverage, 1991 Census

Characteristics	Net number of persons missed		Population net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Canada	**807,254**	**37,971**	**2.87**	**0.13**
Newfoundland	11,566	1,846	1.99	0.31
Prince Edward Island	1,220	366	0.93	0.27
Nova Scotia	17,329	3,475	1.89	0.37
New Brunswick	24,280	3,333	3.25	0.43
Quebec	184,473	15,400	2.61	0.21
Ontario	381,104	32,260	3.64	0.29
Manitoba	20,691	4,310	1.86	0.38
Saskatchewan	18,106	3,416	1.80	0.33
Alberta	51,825	7,553	2.00	0.28
British Columbia	92,236	9,096	2.73	0.26
Yukon	1,107	177	3.83	0.58
Northwest Territories	3,316	374	5.44	0.57

See footnotes at end of table.

Table 9.1   Estimated Population Net Undercoverage, 1991 Census – Continued

Characteristics	Net number of persons missed		Population net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Urban and Rural Areas	**807,254**	**37,971**	**2.87**	**0.13**
Urban areas (by size of population)	592,784	36,018	2.76	0.16
500,000 and over	354,317	29,003	2.92	0.23
100,000-499,999	84,024	11,269	2.83	0.37
30,000-99,999	46,549	9,375	1.83	0.36
10,000-29,999	47,061	8,098	3.01	0.50
Less than 10,000	60,834	8,842	2.65	0.37
Rural areas	214,470	16,522	3.25	0.24
All CMAs	**495,900**	**34,972**	**2.89**	**0.20**
Urbanized core	456,264	32,848	2.92	0.20
Urban fringe	4,893	3,653	1.52	1.11
Rural fringe	34,742	7,920	2.84	0.62
Non-CMAs	**311,355**	**18,315**	**2.85**	**0.16**
Selected CMAs				
Montréal	76,778	8,631	2.40	0.26
Ottawa-Hull	25,329	6,275	2.68	0.64
Toronto	163,630	22,214	4.03	0.52
Vancouver	38,338	5,819	2.34	0.34
All others	191,823	16,712	2.62	0.22
Age and Sex				
Both Sexes	**807,254**	**37,971**	**2.87**	**0.13**
0-4 years	58,883	10,173	3.00	0.50
5-14 years	78,335	11,096	2.03	0.28
15-19 years	56,978	8,853	2.96	0.44
20-24 years	147,910	12,897	7.01	0.56
25-34 years	263,594	19,522	5.14	0.36
35-44 years	105,950	13,691	2.37	0.30
45-54 years	34,020	8,620	1.13	0.28
55-64 years	31,653	7,339	1.30	0.30
65 years and over	29,930	9,499	0.94	0.29

See footnotes at end of table.

Table 9.1   Estimated Population Net Undercoverage, 1991 Census – Continued

Characteristics	Net number of persons missed		Population net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Males	**468,990**	**24,785**	**3.37**	**0.17**
0-4 years	22,583	6,104	2.26	0.59
5-14 years	36,792	7,062	1.86	0.35
15-19 years	26,566	6,522	2.70	0.64
20-24 years	82,727	9,830	7.75	0.84
25-34 years	175,465	15,977	6.76	0.57
35-44 years	71,622	9,694	3.19	0.41
45-54 years	23,031	7,132	1.52	0.46
55-64 years	19,226	5,656	1.60	0.46
65 years and over	10,975	7,039	0.82	0.52
Females	**338,264**	**24,993**	**2.39**	**0.17**
0-4 years	36,300	7,365	3.75	0.73
5-14 years	41,542	7,679	2.20	0.40
15-19 years	30,411	5,617	3.23	0.57
20-24 years	65,183	8,570	6.26	0.76
25-34 years	88,128	9,902	3.48	0.37
35-44 years	34,328	8,142	1.54	0.36
45-54 years	10,989	5,351	0.74	0.35
55-64 years	12,428	4,298	1.01	0.34
65 years and over	18,954	7,137	1.02	0.38
Marital Status and Sex				
Both Sexes	**807,254**	**37,971**	**2.87**	**0.13**
Married or separated	163,942	15,830	1.32	0.12
Divorced	51,533	8,791	3.85	0.63
Widowed	32,471	6,721	2.28	0.46
Never married	559,309	32,604	4.34	0.24
15 years and over	422,091	26,535	5.98	0.35
Less than 15 years	137,218	15,089	2.35	0.25

See footnotes at end of table.

Table 9.1   Estimated Population Net Undercoverage, 1991 Census – Continued

Characteristics	Net number of persons missed		Population net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Males	**468,990**	**24,785**	**3.37**	**0.17**
Married or separated	93,456	13,582	1.50	0.21
Divorced	42,719	7,315	7.11	1.12
Widowed	9,549	3,428	3.78	1.29
Never married	323,267	22,659	4.72	0.31
15 years and over	263,892	18,882	6.83	0.45
Less than 15 years	59,375	9,333	1.99	0.31
Females	**338,264**	**24,993**	**2.39**	**0.17**
Married or separated	70,485	10,477	1.13	0.17
Divorced	8,814	5,199	1.20	0.69
Widowed	22,923	5,753	1.95	0.48
Never married	236,042	18,493	3.90	0.29
15 years and over	158,199	15,294	4.96	0.45
Less than 15 years	77,843	10,710	2.73	0.36
Common Law and Sex (persons in common-law unions)				
Both sexes	**81,873**	**8,670**	**5.34**	**0.53**
Males	49,520	6,189	6.38	0.74
Females	32,354	5,973	4.27	0.75
Mother Tongue[1]	**807,254**	**37,971**	**2.87**	**0.13**
English	438,395	35,520	2.49	0.20
French	172,927	16,258	2.48	0.23
Other than English or French	206,854	15,653	4.85	0.35
Italian	5,862	3,915	1.13	0.74
German	10,518	4,145	2.16	0.83
Chinese	31,143	5,777	5.95	1.03
Other	159,028	12,564	5.77	0.43
Knowledge of Official Languages[2]	**802,353**	**43,148**	**2.89**	**0.15**
English only	531,507	35,518	2.85	0.18
French only	88,167	15,720	2.10	0.36
Both English and French	136,298	15,588	3.01	0.33
Neither English nor French	46,380	7,175	10.92	1.49

See footnotes at end of table.

Table 9.1   Estimated Population Net Undercoverage, 1991 Census – Continued

Characteristics	Net number of persons missed		Population net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Home Language[1,2]	**802,353**	**43,148**	**2.89**	**0.15**
English	505,798	39,351	2.64	0.20
French	156,955	18,990	2.40	0.28
Other than English or French	148,617	14,220	5.72	0.51
Italian	5,241	3,652	1.79	1.21
German	3,736	2,089	2.70	1.46
Chinese	28,632	5,476	6.24	1.11
Other	110,943	11,138	6.48	0.60
Tenure	**807,254**	**37,971**	**2.87**	**0.13**
Owned	302,640	22,367	1.59	0.12
Rented	430,990	25,991	5.09	0.29
Band housing	26,530	4,944	18.38	2.80
Collectives	47,094	7,452	9.07	1.30
Mobility[3]	**625,564**	**37,828**	**2.87**	**0.17**
Place of residence one year ago:				
Same province or territory	550,243	36,614	2.59	0.17
Same address	293,538	28,652	1.63	0.16
Different address	256,704	19,762	7.80	0.55
Different province or territory	27,576	4,336	9.70	1.36
Outside Canada	47,746	5,554	19.99	1.84
Place of residence five years ago:				
Same province or territory	469,797	35,268	2.34	0.17
Same address	28,680	20,791	0.25	0.18
Different address	441,117	26,736	5.16	0.29
Different province or territory	32,385	5,556	3.80	0.62
Outside Canada	123,381	9,367	13.87	0.90
Income in 1990[4]	**664,534**	**37,529**	**3.02**	**0.16**
Negative or nil	115,251	8,992	5.65	0.41
Less than $10,000	274,013	24,478	4.88	0.41
$10,000 – $19,999	148,603	16,790	3.04	0.33
$20,000 – $29,999	88,725	10,476	2.45	0.28
$30,000 – $39,999	33,593	8,476	1.33	0.33
$40,000 and over	4,349	7,943	0.13	0.24

See footnotes at end of table.

Table 9.1   Estimated Population Net Undercoverage, 1991 Census – Concluded

Characteristics	Net number of persons missed		Population net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Work Status in 1990[4]	**664,534**	**37,529**	**3.02**	**0.16**
Worked 49 to 52 weeks	205,109	23,556	2.26	0.25
Full time	190,998	19,013	2.37	0.23
Part time	14,111	14,089	1.38	1.35
Worked 1 to 48 weeks	227,128	17,783	3.62	0.27
Full time	161,744	15,609	3.82	0.35
Part time	65,384	9,562	3.19	0.45
Worked in 1990	432,238	29,976	2.81	0.19
Full time	352,743	23,451	2.87	0.18
Part time	79,495	17,084	2.59	0.54
Did not work in 1990	232,296	18,239	3.52	0.26

1   In the 1991 Census, multiple responses for mother tongue and home language were accepted. Therefore, these estimates and rates are not mutually exclusive.

2   Excluding institutional residents.

3   Excluding persons less than 15 years of age and persons in collective households and households outside Canada.

4   Excluding persons less than 15 years of age and institutional residents.

Table 9.2   Estimated Private Household Net Undercoverage, 1991 Census

Characteristics	Net number of private households missed		Private household net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Canada	**226,743**	**14,396**	**2.21**	**0.14**
Newfoundland	4,012	594	2.25	0.32
Prince Edward Island	278	229	0.62	0.51
Nova Scotia	4,321	1,494	1.31	0.45
New Brunswick	4,853	1,045	1.88	0.39
Quebec	53,507	7,768	1.99	0.28
Ontario	115,925	11,690	3.09	0.30
Manitoba	5,027	2,203	1.23	0.53
Saskatchewan	3,160	1,453	0.86	0.39
Alberta	7,923	2,492	0.86	0.27
British Columbia	26,743	3,743	2.10	0.29
Yukon	317	72	3.10	0.68
Northwest Territories	676	134	4.04	0.76

Table 9.2   Estimated Private Household Net Undercoverage, 1991 Census – Concluded

Characteristics	Net number of private households missed		Private household net undercoverage rate	
	Estimated number	Standard error	Estimated rate (%)	Standard error (%)
Urban and Rural Areas	**226,743**	**14,396**	**2.21**	**0.14**
Urban areas (by size of population)	177,457	13,364	2.20	0.16
500,000 and over	108,236	11,557	2.37	0.25
100,000-499,999	20,935	4,410	1.86	0.38
30,000-99,999	18,117	4,669	1.88	0.47
10,000-29,999	13,073	3,132	2.28	0.53
Less than 10,000	17,097	3,408	2.04	0.40
Rural areas	49,286	6,546	2.26	0.29
All CMAs	**141,782**	**13,084**	**2.23**	**0.20**
Urbanized core	133,457	12,974	2.28	0.21
Urban fringe	2,195	1,300	1.96	1.13
Rural fringe	6,129	2,195	1.58	0.56
Non-CMAs	**84,963**	**8,623**	**2.19**	**0.22**
Selected CMAs				
Montréal	21,836	3,906	1.74	0.30
Ottawa-Hull	11,191	3,909	3.10	1.05
Toronto	44,980	8,226	3.19	0.56
Vancouver	13,300	2,405	2.14	0.38
Other	50,474	6,762	1.86	0.24
Tenure	**226,743**	**14,396**	**2.21**	**0.14**
Owned	46,247	6,219	0.73	0.10
Rented	174,078	12,171	4.47	0.30
Other	6,419	1,267	19.37	3.08
Type of Private Dwelling	**226,743**	**14,396**	**2.21**	**0.14**
Single-detached house	97,576	9,960	1.68	0.17
Semi-detached house	12,431	3,105	2.59	0.62
Row house	4,744	2,870	1.02	0.61
Apartment in a building that has fewer than five storeys	44,635	7,042	2.33	0.35
Apartment in a building that has five or more storeys	22,570	4,893	2.42	0.51
Mobile home	5,070	1,825	2.73	0.95
Other single-attached house	5,643	2,371	10.52	3.91
Duplex	34,089	5,681	8.32	1.26

X. Further Analysis

The previous chapters have contained the basic results of the 1991 Census coverage measurement studies. In this chapter, we present some additional information on coverage errors. Section 10.1. describes the demographic method of estimating net undercoverage and presents results for 1991. Section 10.2. presents some historical comparisons of undercoverage for the five censuses conducted between 1971 and 1991. Section 10.3. presents information on the effectiveness of two new coverage improvement methods that were introduced for the 1991 Census.

10.1 Demographic Estimates of Net Undercoverage

The demographic method of estimating net undercoverage is described in Romaniuc (1988). The method consists of comparing the population count for the census in question with a demographic estimate of the same total. The demographic estimate is obtained by starting with a base population, and then adding or subtracting various components of change to arrive at an estimated population. This method has the advantage of being inexpensive and rapid. However, the quality of the estimates produced by the method depends on the accuracy of all the data which enter into the calculation. The accuracy of these data is often difficult to assess.

In the case of the 1991 Census, the base population consisted of the 1986 Census count adjusted to June 1 (the actual 1986 Census date was June 3), plus an adjustment for estimated net undercoverage in the 1986 Census, as well as an adjustment for the estimated number of non-permanent residents living in Canada at the time of the 1986 Census.

Since there were no direct measures of overcoverage in 1986, an estimate of overcoverage was derived using the assumption that the ratio of overcovered persons to missed persons was the same for each province in 1986 as the national-level ratio observed in 1991. This ratio was then applied to the provincial estimates of missed persons from the 1986 Reverse Record Check to arrive at provincial estimates of overcoverage.

Non-permanent residents were not included in the 1986 Census population universe, so an estimate of the number of such persons in Canada in 1986 was made from administrative sources. From this number was subtracted an estimate of the number of non-permanent residents who were (erroneously) enumerated in the 1986 Census.

The components of change include births, deaths, immigration (landed immigrants), the net change in non-permanent residents, returning Canadians, and emigration. In the case of provincial estimates, interprovincial migration is an additional component of change. These components are estimated from data sources which vary in quality. Estimates of births, deaths, and immigration are generally considered to be of high quality. Estimates of emigration, returning Canadians and interprovincial migration are estimated indirectly from administrative sources and are generally acknowledged as being of lesser quality. Estimates of the net change in non-permanent residents are estimated as the change between "stock" figures based on administrative files for the two points in time and are adjusted for underreporting of certain groups on the files. A more detailed discussion of the component method as applied to the population estimates for 1986 to 1991 can be found in Declos (1993).

Table 10.1 illustrates the demographic method at the national level for the 1991 Census. The estimated net undercoverage was 849,102. This is slightly higher than the estimate from the coverage studies (807,254), but is well within the range of sampling error. The demographically-estimated net undercoverage rate for the 1991 Census is $(849,102)/(28,143,012) = 3.02\%$, compared to the coverage studies' estimate of 2.87%.

Table 10.2 presents demographic estimates of net undercoverage for the provinces and territories, for the 1991 Census. When compared to the results from the coverage studies, the two sets of net undercoverage rates show good agreement for the larger provinces (Ontario, Quebec and British Columbia), but are more divergent for the smaller provinces. This may be due to higher relative levels of error in estimating both the base population and the components of change for the smaller provinces. The demographic estimates of net undercoverage contain all of the errors inherent in the 1986 Reverse Record Check, plus the errors in the adjustments for overcoverage and non-permanent residents in the 1986 Census, as well as the errors in the components of change from 1986 to 1991. The estimates of net undercoverage from the 1991 coverage studies contain the errors in the 1991 Reverse Record Check and the 1991 Overcoverage Study. Because it is felt that the 1991 coverage studies provide the best available

estimates of net undercoverage in the 1991 Census, they were chosen as the basis for adjusting the base population of the Population Estimates Program for net undercoverage.

Table 10.1 Estimation of Net Undercoverage in 1991 by the Demographic Method[1]

1986 Census count (adjusted to June 1, 1986)	25,308,274
+ Adjustment for net undercoverage in the 1986 Census	702,036
+ Adjustment for non-permanent residents in Canada June 1, 1986	166,987
= Base population as of June 1, 1986	26,177,297
+ Births between June 1, 1986, and May 31, 1991	1,930,140
– Deaths between June 1, 1986, and May 31, 1991	944,936
+ Landed immigrants arriving in Canada between June 1, 1986, and May 31, 1991	873,801
– Emigrants from Canada between June 1, 1986, and May 31, 1991	212,465
+ Net change in non-permanent residents between June 1, 1986, and May 31, 1991	207,849
+ Returning Canadians arriving in Canada between June 1, 1986, and May 31, 1991	111,326
= Postcensal estimate of population as of June 1, 1991	28,143,012
– 1991 Census count (adjusted to June 1)	27,293,910
= Demographic estimate of net undercoverage in the 1991 Census	849,102

1 For reasons of consistency, all numbers have been adjusted to June 1.

Table 10.2 Demographic Estimates of Net Undercoverage for Provinces/Territories, 1991 Census

Province/Territory	Postcensal estimate of population as of June 1, 1991	1991 census counts adjusted to June 1, 1991	Demographic estimate of net undercoverage	
			Estimated number	Rate (%)
Canada	**28,143,012**	**27,293,910**	**849,102**	**3.02**
Newfoundland	587,540	568,489	19,051	3.24
Prince Edward Island	133,799	129,760	4,039	3.02
Nova Scotia	921,882	899,898	21,984	2.38
New Brunswick	746,783	723,878	22,905	3.07
Quebec	7,082,419	6,895,414	187,005	2.64
Ontario	10,451,150	10,083,290	367,860	3.52
Manitoba	1,122,229	1,091,908	30,321	2.70
Saskatchewan	1,019,720	988,963	30,757	3.02
Alberta	2,611,772	2,545,274	66,498	2.55
British Columbia	3,378,858	3,281,416	97,442	2.88
Yukon	28,035	27,792	243	0.87
Northwest Territories	58,825	57,828	997	1.69

10.2 Historical Comparisons

Estimates of undercoverage from the Reverse Record Check have been produced for every Canadian census since 1966. An experimental Reverse Record Check was conducted in the 1961 Census but covered only part of the population. Estimates of overcoverage, and therefore of net undercoverage, are available only for the 1991 Census, although an experimental Overcoverage Study was carried out in 1986.

This section compares results from the reverse record checks for 1971 to 1991. Due to the lack of overcoverage estimates for previous censuses, only rates of **undercoverage** are shown. Table 10.3 shows rates of population undercoverage for Canada and the provinces (plus the two territories for 1991), while Table 10.4 shows rates of undercoverage by age groups and sex. In comparing rates across censuses, readers should note the following points:

(a) Census counts for 1971 and 1976 did not include estimates from the Vacancy Check of persons missed in dwellings incorrectly classified as unoccupied. The 1981, 1986 and 1991 Census counts did include such a component. The 1976 rate would have been 1.78% instead of 2.04% had it included the results of the 1976 Vacancy Check. There was no Vacancy Check in the 1971 Census.

(b) Results for Canada before 1991 do not include the two territories. However, the amount of undercoverage in the two territories in 1991 was small enough that it had a negligible impact on the rate at the national level.

(c) Non-permanent residents were not included in the target population prior to 1991. This group had a higher than average undercoverage rate. Had this group not been included in the 1991 Census, it is estimated that the national-level rate of undercoverage would have been 3.16% rather than 3.43%. The undercoverage rates for Ontario, British Columbia and Quebec were particularly affected by the inclusion of non-permanent residents in the 1991 Census target population.

(d) The rates shown here for the 1986 Census differ from the results published in the *User's Guide to the Quality of 1986 Census Data: Coverage*. The rates shown in Tables 10.3 and 10.4 include revisions made after the 1986 publication. The province-level rates also treat incompletely enumerated Indian reserves as "missed", whereas the 1986 publication treated them as "enumerated" since provincial census counts included an estimate of persons missed on such reserves.

(e) For 1971, the age groups above age 24 differ from those shown for the other censuses.

From Tables 10.3 and 10.4, several observations may be made:

(a) The national-level rate of undercoverage was fairly constant at about 2% for 1971, 1976 and 1981, but rose significantly to over 3% in 1986. In 1991, despite several new measures designed to reduce undercoverage, the rate of undercoverage stayed above 3%. This remains true even when the effect of non-permanent residents is excluded.

(b) Among the provinces, British Columbia had the highest rate of undercoverage in every census from 1971 to 1986. In 1991, however, Ontario had the highest rate.

(c) Undercoverage rates for the Atlantic provinces and the Prairie provinces tend to be lower than the Canadian average.

(d) The undercoverage rate for males is higher than the undercoverage rate for females in every census.

(e) The highest rates of undercoverage are found in the 20 to 24 years age group, particularly for males.

Table 10.3 Estimated Population Undercoverage for Canada and Provinces/Territories, 1971, 1976, 1981, 1986 and 1991 Reverse Record Checks

Province/Territory	1971		1976		1981		1986[2]		1991[3]	
	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)
Canada[1]	**1.93**	**0.09**	**2.04**	**0.10**	**2.01**	**0.09**	**3.21**	**0.13**	**3.43**	**0.12**
Newfoundland	2.25	0.72	1.10	0.39	1.74	0.45	1.92	0.33	2.47	0.30
Prince Edward Island	1.23	1.13	0.38	0.25	1.17	0.54	2.14	0.80	1.67	0.23
Nova Scotia	1.33	0.45	0.86	0.34	1.05	0.34	2.15	0.34	2.25	0.36
New Brunswick	1.65	0.56	2.16	0.37	1.81	0.30	2.71	0.33	3.71	0.42
Quebec	2.10	0.19	2.95	0.25	1.91	0.21	2.91	0.31	3.18	0.20
Ontario	1.68	0.12	1.52	0.17	1.94	0.14	3.43	0.19	4.23	0.28
Manitoba	1.13	0.38	1.07	0.33	0.98	0.35	2.94	0.40	2.31	0.36
Saskatchewan	1.00	0.37	1.33	0.34	0.99	0.37	2.38	0.37	2.15	0.32
Alberta	2.55	0.44	1.49	0.26	2.54	0.36	3.00	0.32	2.51	0.27
British Columbia	2.89	0.39	3.13	0.31	3.16	0.33	4.48	0.36	3.42	0.24
Yukon	..	..	..	..	..	..	..	..	4.12	0.58
Northwest Territories	..	..	..	..	..	..	..	..	5.73	0.57

1   Excluding Yukon and Northwest Territories in 1971, 1976, 1981 and 1986.

2   Includes revisions made since User's Guide to the Quality of 1986 Census Data: *Coverage*. Incompletely enumerated Indian reserves are treated as "missed."

3   Includes non–permanent residents for the first time. As well, incompletely enumerated Indian reserves are treated as "missed."

..   Figures not available.

Table 10.4   Estimated Population Undercoverage by Age Groups and Sex, 1971, 1976, 1981, 1986 and 1991 Reverse Record Checks

Age Group	1971		1976		1981		1986		1991	
Both Sexes	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)
All ages	1.93	0.09	2.04	0.10	2.01	0.09	3.21	0.13	3.43	0.12
0 to 4 years	1.99	0.27	2.31	0.28	1.21	0.22	2.14	0.49	3.55	0.49
5 to 14 years	0.90	0.13	1.20	0.16	1.23	0.21	2.08	0.26	2.49	0.27
15 to 19 years	2.60	0.28	1.99	0.38	2.96	0.52	3.58	0.60	3.75	0.42
20 to 24 years	4.49	0.28	5.31	0.38	5.51	0.29	8.66	0.46	8.18	0.52
25 to 34 years	2.50[1]	0.20	2.85	0.28	2.31	0.28	4.51	0.35	5.65	0.35
35 to 44 years			1.54	0.26	2.20	0.26	2.32	0.31	2.84	0.29
45 to 54 years	1.40[2]	0.15	1.22	0.33	0.81	0.23	1.58	0.29	1.61	0.27
55 to 64 years	1.22[3]	0.18	0.92	0.20	0.91	0.29	2.06	0.31	1.69	0.28
65 years and over			1.20	0.25	0.71	0.30	1.76	0.31	1.51	0.28

1 Age group for 1971 is 25 to 39 years.

2 Age group for 1971 is 40 to 59 years.

3 Age group for 1971 is 60 years and over.

Table 10.4 Estimated Population Undercoverage by Age Groups and Sex, 1971, 1976, 1981, 1986 and 1991 Reverse Record Checks – Continued

Age Group	1971		1976		1981		1986		1991	
Males	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)
All ages	**2.27**	**0.12**	**2.46**	**0.17**	**2.37**	**0.13**	**3.75**	**0.16**	**3.95**	**0.16**
0 to 4 years	1.73	0.34	1.32	0.33	1.32	0.33	2.22	0.67	2.79	0.58
5 to 14 years	0.93	0.18	1.14	0.21	1.27	0.29	1.98	0.32	2.32	0.34
15 to 19 years	2.71	0.39	1.93	0.48	3.12	0.68	4.09	0.74	3.55	0.60
20 to 24 years	4.97	0.40	5.99	0.52	6.03	0.48	10.36	0.57	8.98	0.81
25 to 34 years	3.38[1]	0.31	3.64	0.46	2.70	0.44	5.43	0.45	7.28	0.56
35 to 44 years			2.33	0.48	3.42	0.40	3.29	0.51	3.65	0.41
45 to 54 years	1.90[2]	0.24	1.63	0.41	1.21	0.38	1.95	0.52	2.05	0.45
55 to 64 years	1.37[3]	0.28	1.28	0.34	0.91	0.40	1.88	0.47	2.04	0.44
65 years and over			1.90	0.44	0.69	0.47	1.57	0.50	1.41	0.50

1 Age group for 1971 is 25 to 39 years.

2 Age group for 1971 is 40 to 59 years.

3 Age group for 1971 is 60 years and over.

Table 10.4 Estimated Population Undercoverage by Age Groups and Sex, 1971, 1976, 1981, 1986 and 1991 Reverse Record Checks – Concluded

Age Group	1971		1976		1981		1986		1991	
Females	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)	Estimated Rate (%)	Standard Error (%)
All ages	1.59	0.11	1.61	0.10	1.65	0.12	2.68	0.17	2.93	0.17
0 to 4 years	2.25	0.40	2.07	0.36	1.10	0.33	2.06	0.62	4.35	0.71
5 to 14 years	0.87	0.17	1.26	0.27	1.19	0.31	2.20	0.33	2.65	0.39
15 to 19 years	2.49	0.38	2.05	0.51	2.80	0.73	3.05	0.76	3.96	0.54
20 to 24 years	4.01	0.37	4.62	0.48	4.98	0.43	6.89	0.72	7.36	0.71
25 to 34 years	1.58[1]	0.22	2.03	0.38	1.92	0.32	3.59	0.45	3.98	0.37
35 to 44 years			0.72	0.24	0.93	0.31	1.33	0.32	2.01	0.35
45 to 54 years	0.90[2]	0.17	0.81	0.38	0.41	0.26	1.20	0.35	1.16	0.34
55 to 64 years	1.10[3]	0.24	0.58	0.25	0.92	0.34	2.23	0.50	1.35	0.33
65 years and over			0.64	0.38	0.71	0.42	1.89	0.44	1.58	0.36

1 Age group for 1971 is 25 to 39 years.
2 Age group for 1971 is 40 to 59 years.
3 Age group for 1971 is 60 years and over.

10.3 Effectiveness of Coverage Improvement Methods

As noted in Section 10.2., undercoverage rose substantially in the 1986 Census compared to censuses conducted in the 1971 to 1981 period. As a result, Statistics Canada decided to implement several new procedures aimed at achieving better coverage in the 1991 Census. In many cases, such as a decision to reduce the number of CRs that each Census Commissioner had to supervise, the changes were built into the census procedures and their effect was difficult to quantify. In other cases, however, the effects can be separately identified. This section describes the methodology and the results of two specific coverage improvement methods whose effects can be quantified. These are the use of an address register to reduce undercoverage of dwellings, and a special enumeration of persons in soup kitchens.

10.3.1 Address Register

One of the causes of undercoverage is dwellings that are missed by the CR. The objective of the address register operation was to reduce this source of undercoverage. The address register was a machine-readable file of residential addresses that was created specifically for the 1991 Census. It was constructed by merging and unduplicating administrative files such as municipal assessment files and utility company files obtained during the latter part of 1990. Once the address register had been created, each address was coded to the 1991 EA in which it was located. Because this coding could only be done reliably in urban areas, the address register was limited to centres with a population of approximately 50,000 persons or more. In British Columbia, where undercoverage had traditionally been the highest, Statistics Canada worked with the provincial government to extend the coverage of the address register to smaller urban areas and some rural areas as well.

Shortly before Census Day, a computer printout was created for each EA, listing all the addresses that were expected to be found in the EA. Following the drop-off of the census questionnaires, each CR was given a copy of the address register for his or her EA. The CR then matched the addresses listed in the address register to the addresses the CR had listed in his or her Visitation Record. Any addresses that appeared on the address register but that the CR had not listed in the Visitation Record were followed up by the CR to see if they represented a valid dwelling that had been missed at drop-off. If so, the household was enumerated. A record was kept of dwellings added by the address register operation. Subsequent analysis found that dwellings added tended to be small apartments or flats, with most being rental dwellings and containing relatively smaller households.

Table 10.5 shows the number of persons added by the address register operation and the reduction in the net undercoverage rate that these persons represent. At the national level, the address register operation reduced the net undercoverage by 62,885 persons, or 0.22%. The largest improvement was in British Columbia (0.60% reduction in net undercoverage), where the address register was the most extensive. This was followed by Ontario (0.23%) and Quebec (0.16%). Gains were the smallest in the Atlantic provinces and in Saskatchewan.

10.3.2 Soup Kitchen Enumeration

The Canadian census attempts to enumerate persons at their usual place of residence. It is known, however, that some persons have no usual place of residence. The rule in this case is to count such persons where they are found on Census Day. The census already includes several procedures to enumerate persons in places of temporary accommodation, such as shelters, but for 1991, it was felt that additional enumeration procedures were required to try to count persons who might still be missed. After examining several alternatives, it was decided to conduct a special enumeration in soup kitchens located in various cities across Canada. This method appeared to provide the best combination of effectiveness and enumerator safety.

Soup kitchens in 16 cities across Canada were involved. A special questionnaire (Form 3B) was developed for the enumeration. The questionnaire was administered in personal interviews by Statistics Canada enumerators to persons who visited the soup kitchens on Census Day. As well as collecting basic information about the respondent, the questionnaire contained several questions designed to establish whether or not the person had stayed at a dwelling already covered by existing census collection procedures. If the person reported a dwelling already covered by existing procedures, the respondent was classified as a "temporary resident of the soup kitchen" and was eligible to be sampled as part of the Temporary Residents Study (see Chapter 6). If the respondent did not report such an

address (e.g., he or she reported having slept outside on the previous night), the respondent was classified as a "usual resident of the soup kitchen" and was included in the census count as such.

These special procedures were used to interview a total of 5,716 persons in soup kitchens on Census Day. Of this number, 2,065 persons, or 36%, were added to the 1991 Census counts, either directly as usual residents of the soup kitchen or indirectly through the Temporary Residents Study random additions. While an additional 2,065 persons is not a large number in absolute terms, a large proportion (36%) of the persons enumerated in soup kitchens would not have been counted otherwise.

These numbers clearly do not represent a count of the "homeless" population. The soup kitchen enumeration was not designed to estimate the number of homeless persons; and in fact, there does not exist a commonly accepted definition of the homeless population. Experienced soup kitchen staff reported that the number of persons using soup kitchens fluctuates considerably, depending on the time of year and the time of the month. The fact that June 4, 1991, occurred in temperate weather and followed the distribution of social assistance cheques by only a few days may explain why only 5,716 persons were interviewed.

Table 10.5   Persons Added and Reduction in Net Undercoverage Rate from Address Register Operation, 1991 Census

Province/territory	Persons added	Reduction in net undercoverage rate (%)
Canada	**62,885**	**0.22**
Newfoundland	327	0.06
Prince Edward Island	0	0.00
Nova Scotia	534	0.06
New Brunswick	657	0.09
Quebec	11,548	0.16
Ontario	24,004	0.23
Manitoba	1,408	0.13
Saskatchewan	499	0.05
Alberta	3,712	0.14
British Columbia	20,196	0.60

XI. Conclusion

Four main studies were conducted as part of the coverage error measurement program for the 1991 Census: the Vacancy Check, the Temporary Residents Study, the Reverse Record Check and the Overcoverage Study. They were used to identify the main characteristics of undercoverage and overcoverage in the census.

The results of the Vacancy Check and the Temporary Residents Study, which measured two specific sources of undercoverage, were included in the 1991 Census counts. The Reverse Record Check and Overcoverage Study results combined to give estimates of net census undercoverage for the first time. While these estimates of net undercoverage were not included in the 1991 Census counts, they are included in Statistics Canada's postcensal estimates of population.

The following summarizes the main observations made in the previous chapters.

The rate of population net undercoverage was estimated to be at 2.87% in 1991. Undercoverage, which was estimated at 3.43%, is much more prevalent than overcoverage, which was estimated at 0.56%. The net undercoverage rate of 2.87% represents 807,254 persons. For private households, the net undercoverage rate was estimated at 2.21%, which represents 226,743 private households. For both population and private households, the highest rate of net undercoverage among the provinces was in Ontario and the lowest rate was in Prince Edward Island. The highest rates of net undercoverage in Canada were observed in the two territories.

Rates of population net undercoverage were high for persons between 20 and 34 years of age, particularly for males, for single persons, for divorced males, for persons living common law, for recent immigrants and non-permanent residents, for persons who rent their homes, and for persons whose mother tongue is neither English or French.

Private household undercoverage is higher than average when the household rents its accommodation. Households where the dwelling is a duplex or other single-attached structure also have above-average rates of undercoverage.

Undercoverage was also a specific problem on some Indian reserves and Indian settlements due to difficulties in conducting the census enumeration.

Dwellings that are erroneously classified as unoccupied and persons who are temporarily absent from their usual place of residence on Census Day are important causes of undercoverage. Had the results of the Vacancy Check and the Temporary Residents Study not been included in the 1991 Census counts, the net undercoverage rate would have been 0.88% higher.

The undercoverage rate of 3.43% represents an increase over the 1986 undercoverage rate of 3.21%. This increase is largely attributable to the addition of non-permanent residents to the 1991 Census population universe. Had this group not been added in 1991, the 1991 undercoverage rate would have been 3.16%, virtually the same as 1986. Both the 1986 and 1991 undercoverage rates were higher than undercoverage rates during the 1971 to 1981 period.

In summary, undercoverage, and to a much lesser extent overcoverage, are important sources of error in all census data. Census data users should be aware of the existence and have some idea of the magnitude and distribution of coverage errors. The fact that net undercoverage is not distributed uniformly across all population groups is particularly important. While the overall rate of net undercoverage of about 3 percent is relatively small, the rates for some groups can be considerably higher or lower.

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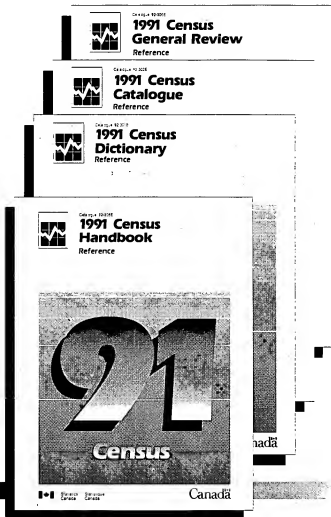
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